The RUBBER AGE

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LATE NEWS of the Industry

Preliminary Survey Figures Indicate Sharp Increase in Tire Dealers' Stocks

PRELIMINARY reports of the annual spring survey of tire dealers' stocks by the Rubber Division of the United States Department of Commerce show that on April 1, 1931, the average stock of automobile and truck casings per dealer was 94.0, according to the questionnaires received from 27,132 dealers. This is 11.0 tires per dealer greater than the final average on April 1, 1930, and 0.4 tires less than on April 1, 1929. The final average on April 1, 1929, was 4.1 tires per dealer greater than the preliminary average, and in April 1, 1930, was 7.9 tires per dealer higher than the preliminary figure.

The total number of automobile and truck casings shown by the preliminary report this year was 2,549,696, which is only slightly under the final total last year of 2,550,222 casings reported by 30,717 dealers, an average of only 83.0 per dealer. The number of dealers accounted for in the preliminary report is unusually high this year, and it is doubtful, therefore, whether the final figures will show as great a change in the average as in past years.

Dealers reporting stocks of high pressure casings were tabulated separately. Of these, 19,415 dealers reported 332,332 high pressure casings in stock, or 17.1 per dealer. This compares with the 544,923 high pressure casings reported by 24,309 dealers on April 1, 1930, an average of 22.4 per dealer. High pressure casings accounted for 21.37 per cent of the total in April, 1930, and 13.04 per cent in April, 1931.

Inner tubes held by dealers average 115.9 as compared with the figure of 118.6 for April 1, 1930, and the record figure of 143.5 for April 1, 1929. The total number of inner tubes reported thus far is 3,160,006, as against the final total of 3,637,543 on April 1 of last year.

There were 1,153 dealers who reported having stocks of solid tires, and their total of 24,517 indicated an average of 21.3 such tires per dealer. On April 1, 1930, 1,436 dealers reported 40,829 solid tires, an average of 28.4 per dealer.

On October 1, 1930, the fall survey of dealers' tire carryover showed an average of only 62.4 casings per dealer. While this figure is not strictly comparable to the 94.0 average of this month, it serves to indicate that retailers have been buying much more heavily this year than last. In the present October to April period, dealers' average stocks gained by 31.6 casings, while in the period from October, 1929, to April, 1930, they rose only 14.6 casings. In the period from October, 1928, to April, 1929, dealers' average stocks showed a gain of 19.6 casings.

Completed questionnaires are still being received and a final and detailed report will be issued by the Rubber Division at the end of April, tabulating the returns by states, and will be published in the May 10th issue of THE RUBBER AGE.

February Output of 3,985,343 Casings Shows 8.5% Increase Over January

PRODUCTION of pneumatic casings for the month of February amounted to 3,985,343 units, an increase of 8.5 per cent over the January figure of 3,674,627, according to statistics released by the Rubber Manufacturers Association. Production for February a year ago amounted to 4,555,758 casings.

This organization reports shipments of pneumatic casings for the month of February to be 3,401,684, a decrease of 9.2 per cent under the January shipments, and 18.9 per cent below February a year ago. The usual seasonal decline is about 8 per cent.

Pneumatic casings on hand February 28th are placed at 9,535,650, an increase of 6.5 per cent over the January figure of 8,957,307 casings, but were 23.2 per cent below February 28, 1930.

Inner tube shipments also fell below production in February. In that month, there were 3,915,962 inner tubes produced and 3,400,169 tubes shipped, leaving a stock in manufacturers' hands of 9,920,966 tubes. Solid and cushion tire shipments exceeded output for the twelfth consecutive month, bringing stocks down to the lowest level in years.

The tire industry is estimated to have consumed a total of 45,813,899 pounds of crude rubber and 15,002,701 pounds of cotton fabric during the month of February in the manufacture of all types of tires and tubes.

The association's estimates are based on reports furnished by manufacturers who produce approximately 80 per cent of the total for the United States, but have been adjusted to represent 100 per cent in the figures quoted above.

General Tire and Rubber Company Cuts Common Dividend to $3 Annual Basis

DIRECTORS of the General Tire & Rubber Company on April 16 declared a dividend of 75 cents a share on the common stock of the company, payable May 1 to stockholders of record April 24. This is a reduction of 25 cents from the previous quarterly payments of $1, putting the stock on a $3 annual basis, and marks the 61st consecutive dividend on General's common shares.

"At the end of the first three months," commented William O'Neil, president, "indications are that 1931 will be a fair year in the rubber industry. There are 3,000,000 fewer tires on hand today than at this time last year. At the same time, it is quite likely more tires will be sold this year than last. It is reasonable to expect that arrival of hot weather will make the new tire need more apparent than up to this time.

"Our plant is now running at 91 per cent of capacity. We have, fortunately, been able to level off our production rather well so that our wages last year were only 9 per cent less than they were a year ago."

Mr. O'Neil two days later was quick to discount rumors to the effect that his company might be involved in a merger with the B. F. Goodrich Company. "Interesting, but not true," he declared. "There is no reason for us to enter into any consolidation with Goodrich and no such consolidation is being considered. General does not contemplate a merger with any company." S. M. Jett, secretary of Goodrich, also denied the report.

United States Rubber Consumption Totaled 32,788 Tons During March

CONSUMPTION of crude rubber by manufacturers in the United States for the month of March is estimated to be 32,788 long tons, an increase of 13.9 per cent over the February consumption of 28,797 long tons according to statistics compiled by the Rubber Manufacturers Association.

Imports of crude rubber for March amounted to 40,338 long tons as compared with 36,645 long tons for February and 45,430 long tons for March, 1930, according to the association's own estimates.

The association estimates total domestic stocks of crude rubber on hand and in transit overland on March 31, at 217,804 long tons, an increase of 2.3 per cent over February, and 53.6 per cent over March, 1930.

Crude rubber afloat for United States ports on March 31 is estimated at 63,133 long tons as against 63,680 long tons on February 28th and 63,646 long tons on March 31st a year ago. The total of 280,937 long tons on hand and afloat to this country marks a new peak for American visible stocks.

Members of Akron Rubber Group Hear Three Papers at Interesting Meeting

THE Akron Group of the Rubber Division, American Chemical Society, held a well attended meeting at Polsky's Tea Room, Akron, O., on the evening of April 20. There were 164 members and guests present at the dinner which preceded the business session, and 50 more came later to swell the audience for the three interesting technical papers presented.

Captain John A. Nelson, U. S. Army, spoke first on "The Quartermaster Corps Procurement Program." Captain Nelson is stationed at Detroit and is in charge of Motor Transport Procurement, including the purchase of automobile tires and tubes. His explanation of the special requirements of the Army for tires and other rubber products was of particular interest.

Harry Morris, of the Firestone Tire & Rubber Company, read a paper on "New Methods of Masticating Rubber." In his talk, he discussed the mastication of rubber by means of the Gordon plasticator and also treated of massing and milling by means of the automatic mill mixer.

The final paper was offered by Harry E. Blythe, assistant to the president of the Goodyear Tire & Rubber Company, on "Airships—Past and Present." He addressed the group on the general subject of airships, but with special reference to modern dirigibles such as the Graf Zeppelin and the U. S. S. Akron. His talk covered the work of the Goodyear-Zeppelin Corporation and was illustrated by slides and motion pictures.

Cliff B. Orr, of the General Tire & Rubber Company, presented an excellent half hour of magic enetertainment, which was enthusiastically received by the other members of the group. The meeting was the first presided over by P. P. Crisp, of the Firestone Tire & Rubber Company, newly elected chairman of the Akron group.

James D. Tew Is Elected President of Rubber Manufacturers Association, Inc.

FOLLOWING a recent meeting of the board of directors of the Rubber Manufacturers Association, Inc., it was announced that James D. Tew, president of the B. F. Goodrich Company, had been elected president of the association to succeed the late Samuel Woolner, Jr. Mr. Tew has been active in the affairs of the association for several years, having been a director since 1928 and first vice-president since 1930.

JAMES D. TEW

The fifth president of the B. F. Goodrich Company since its organization in 1870, Mr. Tew started his association with the company as a shop worker in 1906. In 1925 he became assistant manager of the works department and manager the following year. He was named first vice-president in September, 1927, and president in March, 1928.

F. B. Davis, Jr., president of the United States Rubber Company, was elected first vice-president of the association, and C. D. Garretson, president of the Electric Hose & Rubber Company, was reelected second vice-president. W. H. Lalley, president of the Kelly-Springfield Tire Company, and Herbert E. Smith, vice-president of the United States Rubber Company, were elected members of the board of directors, succeeding Mr. Woolner and H. L. McClaren, resigned.

A. F. Townsend, president of the Manhattan Rubber Manufacturing Division of Raybestos-Manhattan, Inc., and Mr. Lalley were elected members of the executive committee, succeeding Mr. Woolner and P. W. Litchfield.

(Other news of the industry will be found on Pages 83-88)

An Excellent Stand of Young Estate Rubber

What Capital Costs Should be Incurred in Planting Rubber?

By **D. M. MATTHEWS**
Professor of Forest Management, University of Michigan

WHEN the price of rubber on the principal world markets was 40 cents per pound or more, the amount of capital which might be safely invested in bringing an acre of rubber to the bearing stage seemed of less importance than the amount and permanence of the resulting crop. The aim of planters has always been higher and still higher yields per acre. Through the aid of scientific research these have been obtained to a degree which has surpassed everyone's expectations and, as was natural enough when a big spread existed between current costs of production and selling prices, the relation of these high yields to the capital costs of production was largely disregarded. The inexorable laws of compound interest have been given but scant consideration by rubber companies and it would probably come as a shock to many of them to realize that when money is worth 8 per cent interest the difference between the capital value of a permanent income and an income of the same amount terminable in 30 years is only 10 per cent.

The high prices which led the European planter to forget the laws of compound interest brought another class of planters into the field which knew nothing about interest, compound or otherwise, and which was therefore utterly indifferent to the permanence of income from one area as long as it was satisfactory while it lasted and was replaceable. This was the native who, with plenty of land but little capital, worked for such yields as he could get with small expenditure. The two classes are now fighting it out on a market which is unfavorable to both but which will probably stabilize at a level which will leave native methods ruling the situation. European and American plantation companies should give due consideration to this possibility before continuing with their attempt to meet low prices by increasing their per acre production with consequent high capital costs. High yields and permanent yields have very evident values. The relative values of lower yields on shorter terms need examination as they are not so evident.

If the possibility of greater profits arising from operating rubber plantations on shorter rotations with lower costs of establishment be given consideration then an allowance must be made for a reserve to cover the cost of replanting as and when this is necessary. Foresters and mining engineers have long been using certain financial formulae in the determination of property values and to assist them in framing financial and technical policies of management. This is because the revenues derivable from forest and mining properties are often terminable annual or periodic incomes, which may be increased or diminished, prolonged or shortened, as the management decides on a liberal or meagre policy in regard to capital and upkeep costs. One of the most useful of these formulae is the so-called "sinking fund formula" used in mine valuation for the determination of present worth:

$$P.W. = \frac{A}{\cdot op \div \frac{\cdot os}{1 \cdot os^{n}-1}} \text{ where}$$

Young Rubber Estate with Cover Crop, Chinese Owned, in Sarawak

"P.W." = the present worth or value of the mine.
"A" = annual income from the mine.
"p" = the rate of interest expected on the present worth or capital cost.
"s" = rate of interest expected on a sinking fund which is built up by annual payments during the life of the mine to equal the amount of present worth at the time the mine is exhausted.
"n" = the expected life of the mine or the years during which the income "A" will be received.

For the purposes of this discussion a rubber plantation may be likened to a mine with revenues running for various periods of "n" but instead of solving to determine present worth we can assume this as equal to various planting costs and by a transposition of the formula solve to determine the yield of rubber required over various periods to justify assumed capital expenditures in bringing a plantation to the bearing stage.

The transposed formula would read as follows:

$$R = P \left[\cdot op \div \frac{\cdot os}{(1 \cdot os^{n}-1)} \right] \text{ where}$$

"P" = the cost of bringing an acre to the bearing stage.
"p" = the rate of interest required on cost "P."
"s" = the rate of interest allowed on sinking fund payments.
"n" = life of the estate before replanting has to be undertaken.
"R" = the value of the annual yield of rubber to be divided by the net value of rubber per pound to determine the yield in pounds required to pay interest on planting costs at the rate "p" and set up a sinking fund to replant as and when required which earns interest at the rate "s."

In order to apply the above formula a net value per pound of rubber will have to be assumed and a reasonable rate of interest allowed in the calculation. Costs of production for the purpose of arriving at a net price per pound may be assumed as under:

Tapping and collection	2.5c	per lb.
Manufacturing and shipping	2.5c	" "
General charges including rent on land	3.0c	" "
Freight and insurance	2.0c	" "
Total	10.0c	" "

If the price of rubber levels off at 13c per pound this will leave a net return of 3c per pound to pay interest on the investment in planting and set up a sinking fund for replanting. In the calculations which follow the interest allowed on the planting cost has been arbitrarily set at 8 per cent and the interest on the sinking fund payments at 6 per cent.

Solving the above formula with the cost of bringing an acre of rubber into bearing set at $50, which may be approximately what a native planter spends, we find that if his crop runs for five years only, the trees then being tapped to death, the yield required is as under:

$$R = \$50 \left[.08 \div \frac{.06}{(1.06^{5}-1)} \right] \text{ or } \$50 \times (.08 \div .1773)$$

or $50 x .2573 = $12.86 and with the net value of rubber at 3c per pound a yield of $\frac{\$12.86}{\$0.03}$ or 429 pounds per acre per year would be required for the five years to pay 8 per cent on the planting cost and set up a sinking fund to finance replanting at the end of that period when interest is earned at the rate of 6 per cent on sinking fund payments.

Solving with the same planting cost but for periods of 10, 15, 20, 25, and 30 years we find that the rubber yield per year required is as under:

Native Garden in Sarawak

Yield required for a 5-year period with planting cost at $50 = 429 pounds.
Yield required for a 10-year period with planting cost at $50 = 260 pounds.
Yield required for a 15-year period with planting cost at $50 = 205 pounds.
Yield required for a 20-year period with planting cost at $50 = 178 pounds.
Yield required for a 25-year period with planting cost at $50 = 160 pounds.
Yield required for a 30-year period with planting cost at $50 = 155 pounds.

These required yields increase in proportion to any increase in the cost of bringing an acre of rubber to the bearing stage and therefore it is possible to prepare a table indicating the yield required for any assumed planting cost.

TABLE

Period of Yield: Yield of rubber required in pounds per acre per year at a net value of 3c per pound to pay 8 per cent on planting cost and set up a sinking fund, on which 6 per cent is earned, to replant area at end of period of yield when planting costs per acre are:

Year	$50	$100	$150	$200	$250	$300	$350	$400	$450	$500
5	429	858	1277	1716	.....	.....	.....	.....	.....	.....
10	260	520	780	1040	1300	1560	.....	.....	.....	.....
15	205	410	615	820	1025	1230	1435	1640	.....	.....
20	178	356	534	712	890	1068	1246	1426	1602	.....
25	160	320	480	640	800	960	1120	1280	1440	1600
30	155	310	465	620	775	930	1085	1240	1359	1550

Significant facts to be noted from the above table are

that relatively large increases in yield per acre are required to pay interest at 8 per cent and set up a 6 per cent sinking fund for replanting when the bearing period is reduced from 15 to 10 years or from 10 years to 5 years. A much smaller increase is required when the bearing period is reduced from 25 to 20 years or 20 to 15 years; and after an area has been in bearing 25 years there is hardly any difference in required yields for longer periods of bearing. This being the case it is evident that after an estate has been in bearing for as long as 15 years any material drop in yield cannot be compared by longer life of the plantation. Therefore, it follows that high capital costs of establishment cannot be justified merely on the basis of long bearing periods.

On the other hand, high yields do justify high capital costs of establishment within certain rather definite limits which are, in part at least, indicated by the table. For instance, the capital cost which will be justified by a yield of approximately 1,000 pounds per acre per year can be read from the table. If it is to run for 25-30 years $350 can be spent on establishing an acre of plantation but this capital cost must be reduced by $50 for every five years that the bearing period is shortened and if the yield is to run 10 years only a maximum of $200 could be spent in establishing an acre of plantation.

Looked at from another angle, it is to be noted that when capital costs are doubled the period of any fixed yield which is to pay 8 per cent interest on planting cost and build up a reserve at 6 per cent interest which will finance replanting must be more than tripled. Thus a planting cost of $100 can earn 8 per cent interest and be liquidated at 6 per cent by 10 average yearly yields of 520 pounds per acre. A planting cost of $200 requires a

Young Rubber in Palembang. Newly Planted in the Foreground and 3 to 4 Years Old in Background

yield of 620 pounds per acre per year for 30 years if interest at 8 per cent is to be paid and liquidation effected at 6 per cent; but a planting cost of $400 requires an annual yield of 1,240 pounds for 30 years vs. a yield of 1,040 pounds for 10 years if only $200 is expended on bringing an acre to the bearing stage.

A consideration of the above facts raises the very pertinent question as to the possibility of costly scientific selection of stock resulting in yields sufficient in quantity over long enough periods to compete with the moderate yields which the native can get at low costs on short rotations. It further suggests that very possibly greater earnings can be made on the money available for investment in the production of crude rubber by following more closely native methods and costs than by seeking to develop high yielding, long bearing plantations with consequent high costs of establishment. A concrete example will probably develop the line of reasoning leading up to this conclusion more clearly than further detailed discussion.

Let us assume that an area of 1,000 acres of land is to be planted to rubber and that the choice lies between the intensive and costly methods hitherto practiced by most large plantation companies, which aim at permanent or semipermanent yields, and the extensive methods practiced by the ordinary native who has little capital to spend in planting and who is primarily interested in getting a quick crop, but not particularly interested in its permanence. If the land is not covered with heavy timber, a stand of four or five hundred trees per acre of ordinary planting stock could probably be established at a cost not to exceed $30 an acre. Such a planting would probably reach the bearing stage, from the native standpoint, in three to four years, but we will assume that tapping is not commenced until five years after planting and that the cost of planting is debited with compound interest at 8 per cent for this period. Therefore, at the time tapping commences, interest charges will have amounted to $14.08 per acre and in order to be on the conservative side, we may assume that the total investment at this time amounts to $50 an acre. Native tapping is ordinarily heavy and it may be fair to assume that yields averaging 350 pounds per acre of rubber per year could be obtained from the plantation for from 10 to 20 years. If we allow for the redemption of the capital cost of $50 per acre at 6 per cent interest, the interest earned on this capital after allowing for the setting aside of reserves for redemption of capital, can be calculated as under:

Using the formula for determining present worth:

$$P.W. = \frac{A}{\cdot op \div \frac{\cdot os}{1 \cdot os^{n}-1}}$$

we can set the planting cost equal to "P.W." and the annual revenue is, of course, "A." The interest on the sinking fund is set at 6 per cent and we are in a position to solve for · op:

$$\$50 = \frac{350 \text{ lbs. of rubber x } 3c}{\cdot op \div \frac{.06}{1.06^{10}-1}} \quad \text{or} \quad \$50 = \frac{\$10.50}{\cdot op \div .0758}$$

and, multiplying both sides of the equation by (· op ÷ .0758) we get ($50 x · op) ÷ $3.79 = $10.50 and sub-

On One of the Oldest European Rubber Plantations in the Far East

tracting $3.79 from both sides and dividing by $50 we get $\cdot op = \frac{\$6.71}{\$50.00}$ or $\cdot op = .134$, indicating that the interest earned on the planting cost will be 13.4 per cent per year for 10 years.

If the yield of 350 pounds is maintained for 20 years then the calculation becomes:

$$\$50 = \frac{\$10.50}{\frac{.06}{\cdot op \div \frac{}{1.06^{20}-1}}} \text{ or } \$50 = \frac{\$10.50}{\cdot op \div .02718}$$

and $\cdot op = .183$ indicating an earning capacity of 19.3% for 20 years.

It is to be remembered that in the above calculations redemption of capital has been allowed for, and that the actual expenditure in planting has been debited with 8 per cent compound interest during the waiting period. It appears, therefore, that if the native method of planting were adopted, 1,000 acres of rubber could be brought to the bearing stage for an actual outlay of $30,000, which, with compound interest added, would amount to approximately $50,000, when tapping commenced. With the commencement of tapping, and an expected 20-year tapping life, funds would be available from the sale of rubber in sufficient quantity to pay 18.3 per cent interest on $50,000, or approximately $9,150 a year. These dividends would be available for 20 years when it is assumed the plantation would be tapped to death and would have to be replanted. However, by this time, sinking fund payments with interest at 6 per cent would have built reserves up to $50,000, which would be available for replanting. Replanting would again cost $30,000, and as $50,000 would be available, this would be more than sufficient to pay 8 per cent on the $30,000 during the second waiting period of five years. Therefore, at the end of the first waiting period, the company would be in a position to pay $9,150 a year for 20 years and then $2,400 a year for five years, and again $9,150 a year for a second 10-year period, and so on.

Figuring Possible Dividend Payments

However, with any large estate, it is not probable that all the area would be planted at one time, and consequently waiting periods and bearing periods would overlap on different parts of the area so that a steady average revenue would be received from the whole property. The weighted average of possible dividend payments can be figured as follows: Five years at $2,400 a year would amount to $12,000, 20 years at $9,150 would amount to $183,000, so that the gross dividends for any 25-year period would be $195,000, or approximately $7,800 a year for any 1,000-acre area. After the first waiting period, if the compound interest on this first waiting period is neglected and only the $30,000 first expended taken into account, an estate which was developed by the above described native method should be in a position to pay dividends of $7,800 a year on every $30,000 invested in the actual planting operation. If we assume that rent on land is carried directly in production costs, as was the case in calculating the 10c production cost above, then the property will be in a position to pay 26 per cent or more in dividends less such depreciaton charges as it might be desirable to allow for other capital expenditure, such as buildings, factories, etc.

Turning now to a consideration of costs and returns involved in planting 1,000 acres by the standard methods of best estate practice, we will find that impossibly high yields per acre are required to equal the earning power of an estate brought into bearing by the cheap native method. On page 52 of "The Plantation Rubber Industry"* Figart gives the yearly apportionment of capital expenditure for his estimate of capital costs for estates in Malaya and Sumatra. His total for opening and planting heavy jungle land is $350 per acre and for light jungle or grass lands $300. Using the latter figure in order to more closely approximate the character of land usually planted by natives, the annual expenses plus compound interest at 8 per cent up to the sixth year are as follows:

Expenditure 1st year	$120	plus 8% interest to 6th year....	$176.00
Expenditure 2nd year	35	plus 8% interest to 6th year....	47.60
Expenditure 3rd year	45	plus 8% interest to 6th year....	56.60
Expenditure 4th year	30	plus 8% interest to 6th year....	34.50
Expenditure 5th year	40	plus 8% interest to 6th year....	43.20
Expenditure 6th year	30	plus 8% interest to 6th year....	30.00
Total	$300	With Interest	$387.90

If we assume that the planting company is willing to forego interest during the waiting period and further assume that an estate brought in with this expenditure will have a bearing life of 30 years, vs. a 20-year life in the case of the estate planted by native methods, and this without any upkeep expense, then the yield required to earn a return equal to the native planted area can be calculated as follows:

$$\$300 = \frac{A}{.26 + \frac{.06}{1.06^{30}-1}} \text{ or } \$300 = \frac{A}{.2726}$$

and solving, A or required annual return in dollars, is $300 x .2726, or $81.78. If rubber is worth $3 per pound net then this indicates a required yield of $\frac{\$81.78}{.03} = 2726$ pounds of rubber per acre per year vs. the 350 pounds per acre per year required by the property developed by native methods.

Even such a yield as this, which it would seem today is far beyond the bounds of possibility, would not put the estate on a parity as to earning power with the previously discussed property for subsequent waiting periods have not been included in the calculation.

Intensive Planting and Higher Costs

The above comparison has not been made for the purpose of discouraging further investment of capital in the rubber plantation industry, nor must it be understood as an argument advocating entire reliance on native initiative for our future supplies of rubber. The purpose is rather an attempt to prove that the solution of the problem of a continuing supply of rubber for the world's needs at reasonable prices may not lie altogether along the line of intensive plantation practice, leading to higher and higher yields per acre, which can only be obtained by high maintenance and capital costs. It has been assumed by some that what the rubber plantation industry needed was a year or two of ruinous prices during which the small planter would be squeezed out and that thereafter the strongly financed, excellently planted and managed estate would come into its own again. We are passing through such a period now but it appears that the native planter is in a better position to weather the storm than the large estate.

Many persons, better informed as to present conditions in the Middle East than the writer and reasoning from a somewhat different angle, have come to the conclusion that

*"The Plantation Rubber Industry in the Middle East," David M. Figart. U. S. Dept. Commerce Trade Promotion Series Bull. No. 2.

(Concluded on page 78)

Toxic Substances *in the* Rubber Industry

PART XX

By **P. A. DAVIS, A.B., M.A., M.D.**

Assistant Medical Director, Goodyear Tire & Rubber Company

SULPHUR MONO-CHLORIDE

SULPHUR mono-chloride S_2Cl_2 is of vast importance to the rubber industry and especially to the mechanical goods department where thin walled articles are to be vulcanized by the "cold cure" method.

There are two other chlorides of sulphur but they are not used to any great extent, SCl_2 and SCl_4.

Sulphur mono-chloride S_2Cl_2 is a dark yellow liquid, being the most stable of the chlorides but very unstable chemically. It fumes on exposure to the air. It has a very unpleasant, penetrating and suffocating odor and is very irritating to the mucous membranes. It has a Sp. Gr. 1.705, boils at 138° and solidifies at 80°. It decomposes in the open if any moisture is present, in the following manner:

$$2S_2Cl_2 \text{ plus } 3H_2O \longrightarrow 4HCl \text{ plus } 2S \text{ plus } H_2S_2O_3$$
$$H_2S_2O_3 \longrightarrow H_2SO_3 \text{ plus } S$$
$$H_2SO_3 \longrightarrow H_2O \text{ plus } \mathbf{SO_2}$$

S_2Cl_2 is presumed to combine with the rubber molecule with a resulting compound which has a formula of $(C_{10}H_{16})_2\ S_2Cl_2$. It is prepared by passing chlorine over heated sulphur 2S plus 2Cl S_2Cl_2.

The unstable character of S_2Cl_2 makes it a very disagreeable substance to work with and the by-products are such that it is very irritating to the human organism. SO_2 is the largest by-product and some H_2SO_4 is formed which is very irritating.

Ogata and Lehman have shown that human beings show signs of irritation from SO_2 in as dilute atmosphere as .01 part to 1000 parts and that susceptible individuals shows this in as dilute as .03 parts per 1000. Animals are killed in many instances in .8 parts per 1000.

Constant exposures often produce an atrophic rhinitis with subsequent septal ulcers.

One of the best methods of determining SO_2 is that used by R. J. McKay and D. E. Ackerman (*Journal Industrial and Chemical Engineering*, May, 1928).

The use of S_2Cl_2 in the rubber industry is gradually being decreased for two reasons, first, there are better methods of vulcanization being developed and second because of its irritative and disagreeable nature. If S_2Cl_2 is spilled on the skin it produces a drying and extraction of fats which if continued produce a moist eczematous skin condition which is stubborn in healing. The symptoms which develop from exposure to S_2Cl_2 are a composite of those which develop from H_2SO_4, SO_2, HCl and S_2Cl_2 and are as follows:

Acute Symptoms

A. Acute irritation of mucosa of eyes, nose, throat and bronchioles with a resultant oedema of throat and a feeling of suffocation. SO_2 is apparently converted into H_2SO_4 at the mucous membrane surface and produces a local acidosis with subsequent swelling.
B. Dyspnea.
C. Cyanosis.
D. Sever pain in chest.
E. Increased pulse and palpitation.
F. Difficulty on swallowing.
G. Vomiting—blood streaked.
H. Convulsions.
I. Oedema of glottis with feeling of death.
J. Suffocation and death.

Such a train of symptoms develop when the individual is caught in a concentrated atmosphere S_2Cl_2 as when a container is broken or when a curing vat explodes.

Mild or Chronic Symptoms

A. A chronic rhinitis, conjunctivitis and laryngitis.
B. Acidosis.
C. Gastric disturbances with some nausea.
D. Dermatitis.
E. Bronchitis.
F. Irritative nephritis.
G. Adenitis.
H. Passive congestion of lungs and abdominal organs.
I. Destruction of red blood cells and increased blood dust.
J. Increased hematin in urine.
K. Hyperacidity of urine with increase in sulphates, chlorides and sulphur compounds.
L. Secondary or toxic anemia. The blood coagulation time is often decreased. One case of gastric hemorrhage developed. X-rays, test meals, and fluoroscopic examinations did not reveal any ulcers or malignancy. Adrenalin by mouth, rest in bed and no further exposure produced a cure.

Preventive Measures

The nature of S_2Cl_2 necessitates it being handled with care and the decomposition products must be handled as all irritative gaseous substances.

1. Removal of individual from contact with the substance.
2. Proper ventilation (suction) with operations under closed hoods or in curing rooms that are air tight.
3. Wearing of rubber gloves when handling the liquid.
4. Respirators if the concentration is over .03 or .04 parts per 1000.
5. Frequent change of personnel, rotation of personnel.
6. Frequent analysis of the air.
7. Frequently examination of personnel.
8. Substitution of other methods and less disagreeable vulcanizers.

If this procedure is followed one should only occasionally experience any difficulty of a serious nature.

Remedial Measures

1. Acute cases or emergency cases.
   A. Immediate removal to fresh air.
   B. Artificial respirations.
   C. Oxygen inhalations.
   D. Irrigations of the eyes, nose and throat with dilute solutions sodium or magnesium carbonate.
   E. Alkalies by mouth ($NaHCO_3$, MgO, Mg $(OH)_2$, $CaCO_3$. Sol Ca $(OH)_2$.)
   F. Copious amounts of water.
   G. Adrenalin or ephedrin.
   H. Ice packs to throat.
   I. If glottis is closed, tracheotomy.
   J. Blood transfusion if much blood destruction is present.

K. Intravenous glucose solution.
L. Heart stimulations.

2. If the case is one that has a more or less chronic nature, removal from the contaminated atmosphere to fresh air for a period of time will usually clear up all the symptoms except a chronic bronchitis, dermatitis, atrophis rhinitis and a septal ulcer.

The dermatitis will respond to a bland alkaline ointment and ultra-violet rays.

The atrophic rhinitis or a septal ulcer should be treated by a nose specialist.

The bronchitis is very stubborn and there is some persistent pain after many weeks have elapsed. If the individual gets into an atmosphere where there are any volatile sulphur compounds present, he experiences a fear of suffocation.

X-ray pictures of the lungs in such cases show a marked peribronchial infiltration. A persistent cough is always present and can only be controlled by narcotic cough mixtures and diathermy treatments to chest.

Conclusion

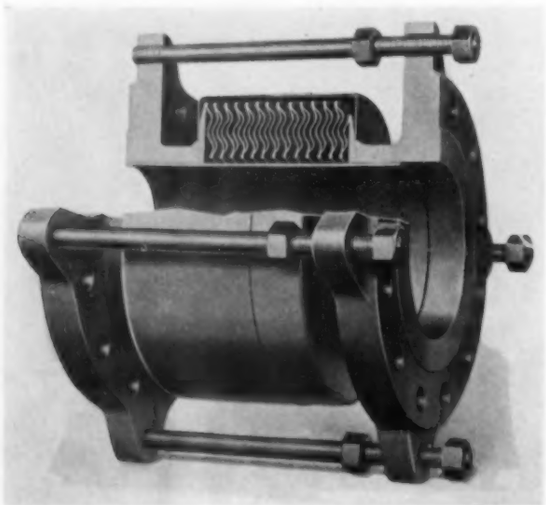
I believe that because of the mild nature of the various symptoms that develop we are inclined to give S_2Cl_2 very little attention until a serious condition has developed, and also because of its very disagreeable odor we think it is a warning against absorption .

Slow absorption with accumulation is always a serious condition when the break down does happen. Often an individual develops a slight coryza or bronchitis and it is diagnosed as an infectious condition, but several weeks later, after "no improvement" it is found to be due to some irritative substance and a removal of the individual from contact with any irritative substance produces a cure. One should investigate any case of dermatitis which appears to be irritative in nature. In concluding, S_2Cl_2 should be treated as a poison both liquid and gas and if this efficiently done very few cases of absorption will develop. It is being replaced by other methods of vulcanization in the rubber industry and therefore it is less of a hazard than in previous years. Unless the condition is an emergency and suffocation results, the individual responds to treatment very rapidly and very little lost time should result, for other kinds of work can be done while recovery is taking place. Individuals who have had severe bronchial irritations from S_2Cl_2 should in the future be placed on work where volatile sulphur compounds are not used.

Flexo Disc Expansion Joint

THE Croll-Reynolds Engineering Company, 17 John Street, New York City, have placed on the market the FlexoDisc Expansion Joint, an entirely new type of expansion joint for pipe lines, illustrated below.

This joint permits free movement of the piping without strain through the use of a flexible heat treated nickel steel expansion element, welded to forged steel flanged heads which are guided relative to each other to permit longitudinal movement only. A special design is offered where lateral or angular misalignment must be provided for.



New Flexo Disc Expansion Joint

In operation, the movement of the FlexoDisc expansion joint is analagous to the action of a coil spring, in that the element takes up the expansion and contraction of the piping by the elastic deflection of the plates. Therefore, since the stresses are entirely within the elastic limit, the life of the element is practically unlimited, state its manufacturers.

This expansion joint is particularly suitable for power plant piping, process steam lines to vulcanizers, molds, dryers, etc., and other similar piping used in rubber plants since it eliminates leakage troubles, enforced shutdowns, and other repair or maintenance work.

Plantation Costs

(*Continued from page 76*)

the native planter will always be a large factor in producing the world's supply of rubber regardless of prices. A further conclusion which may be drawn from the above calculations is that the obvious financial success of native methods, which are admittedly crude but only apparently short-sighted, points the way to a compromise between the two extremes which may be the true economic solution.

I am indebted to a student of the rubber plantation industry for criticism of this paper and for the following suggested estimate of costs and production if estates were established by methods which partially follow those of the native planter:

"The average cost of bringing rubber into bearing today on large scale operations may be around $300.00 per acre, plus compound interest. It is suggested that these costs could be lowered to say $150.00—*or even less* by partially adopting native methods as follows:

(a) By cutting jungle, burning it with little or no clean clearing. Terrace, burned and drained if deemed advisable.
(b) Plant thick, say 300 or 400 trees per acre.
(c) Rough clearing for first two years to give trees a start over jungle growth.
(d) Then abandon till bearing age.
(e) Clean roughly and thin rubber say to 100 trees per acre.
(f) Tap with less stress on bark consumption, by day wage, by contract on a per pound basis or on a share basis, as desired, or as labor conditions and the price of rubber dictate.

"It seems likely that rubber planted and produced as described above can be made to yield up to six hundred pounds per acre after eight or ten years of age and will have a rotation of twenty-five or more years. If budded stock is used this may be increased to eight hundred or twelve hundred pounds or more per acre."

Using the above figures and a spread of 3c per pound between costs and selling prices the earning power of such a venture can be calculated as under:

$$\$150 = \frac{600 \text{ lbs. x } 3c}{\cdot \text{ op} \div \frac{.06}{1.06^{30}-1}} \text{ or } \$150 = \frac{\$18}{\cdot \text{ op} \div .0126} \text{ and}$$

$$(\$150 \text{ x } \cdot \text{ op}) \div \$1.89 = \$18 \text{ or } \cdot \text{ op} = \frac{\$16.11}{150} \text{ or}$$

$\cdot$ op = 10.7%.

To equal the earning power of the native plantation the yield required would be some 1,360 pounds per acre for a 30-year period which, it would appear, is not beyond the bounds of possibility.

The Effect of Grit Upon the Stress and Strain Properties of A Carbon Black Stock

Grit in Amounts Up to 3 Per Cent Had Little Effect on Tensile or Modulus—Degree of Dispersion in the Mix Suggested as a More Effective Test Than Amount of Coarse Material

By **E. P. W. Kearsley and C. R. Park**

Laboratory of United Carbon Company, Charleston, W. Va.

NUMEROUS papers have appeared from time to time dealing with detection of grit in rubber pigments, in practically all of which it has been tacitly assumed that grit seriously impairs the quality of the pigment. Rubber articles, especially tire treads, made with pigments containing even small amounts of gritty material are considered inferior, and specifications covering grit are usually quite rigid. Pigment manufacturers have gone to great lengths to produce grit free pigments, and the resulting product undoubtedly justifies the additional manufacturing care exercised.

The importance of differentiating between actual grit and agglomerates of pigment particles which are subsequently dispersed during mixing operations has been pointed out by E. A. Murphy (*Trans Inst. Rubber Ind.* 2, 100-6, 1926), and various methods of accurately determining true grit suggested by this same author, G. Gallie and B. D. Porritt (*Trans Inst. Rubber Ind.* 2, 116-9, 1926) W. Esch (*Gummi-Ztg.* 41, 82, 1926, Fritz Evers (*Kautschuk* 70-7, 1927), and others. The difficulty with which carbon black may be elutriated has limited the employment of such an agency in determining the amount of grit present in it, and the laboratory has been confined to the use of screens of various size aperture for this purpose.

That the presence of small proportions of relatively coarse particles in carbon black may not impair the abrasion-resistance of rubber compounds employing it has been demonstrated by D. F. Twiss (*Trans. Inst. Rubber Ind. Vol. II*, 2, 82-3, 1926) who determined the abrasion-resistance of three mixings containing rubber and carbon blacks (identical with the exception of grit content) in the proportion of 100 : 40 as follows:

	Grit (90 *mesh screen*)	Abrasion Resistance
A	0	1.03
B	0.09	1.06
C	0.10	1.00

The explanation offered is that no simple relationship exists between resilient energy and abrasion resistance, which is further indicated by the disproportionate effects on these two characteristics produced by the introduction of an organic accelerator.

It is probable, especially in view of the above evidence, that particles of grit present in a tire tread stock are simply dislodged during the abrasion process and have no influence whatever upon the wear resisting properties of the main body of the stock. The dislodgment of amounts of the order of .1% would certainly not produce a measurable effect.

It seems more logical to search for an effect of gritty material upon the tensile strength. The formation of vacua (Green, *Ind. Eg. Chem.* 13, 1029 and Endres, *Ind. Eng. Chem.* 16, 1148) or the shearing action of sharp edges are commonly considered causes of reduced tensile strength.

A reduction in tensile due to these causes seems not improbable in the case of the coarse and irregularly shaped particles in question. The literature offers little direct evidence upon the effect of grit in rubber mixes and the present series of experiments has been conducted to fill this gap in our information.

A standard sample of carbon black was chosen which gave practically no residue on a screen of one hundred mesh. Grit screened from carbon black at a carbon black plant was ground in a mortar until it passed one hundred mesh. Thus the maximum particle size was of the order of 100 μ. and ranged down to considerably smaller dimensions. It can be taken for granted, however, that all the material was exceedingly coarse as compared with channel black which ranges in particle size from 40 to 120 $\mu\mu$. according to various investigators. The material prepared as outlined above was added to the standard black in such amounts as to give a series of samples containing from 0 to 10% added grit. The resulting samples of black were mixed into rubber in the usual way, and tested for tensile properties.

In order to insure complete dispersion the black was mixed into a 40 black 60 rubber master batch in all cases, and subsequently milled into the final stock.

The formula used was as follows:

Rubber	100	Sulfur	3.50
ZnO	5	D. P. G.	1.25
Carbon Black	47		

Cures were made at 20, 60 and 90 minutes at 140° C.

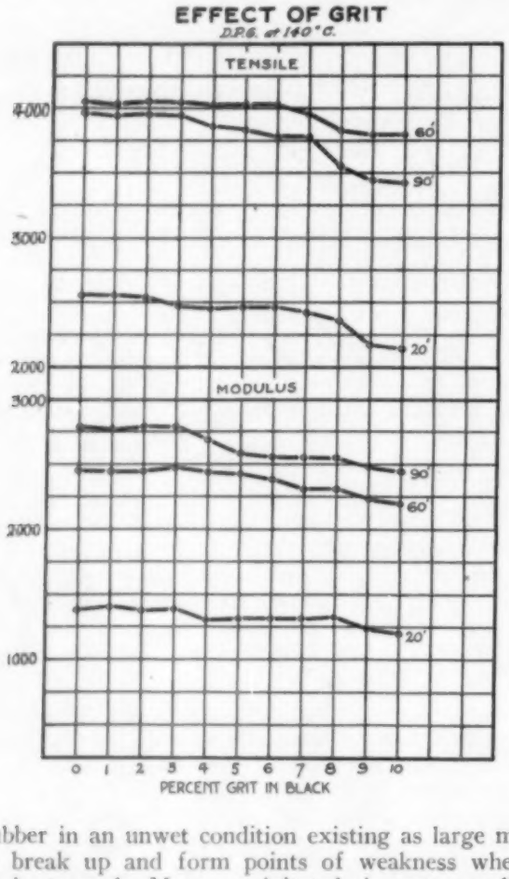
Tests were conducted according to the recommended procedure of the Physical Testing Committee, except in the following respects: Surface speed ratios on the mill were 1 : 1.25 and tensile tests were made on the Goodyear type testing machine.

The results are shown in the accompanying chart. It is a rather astonishing fact that grit in amounts up to 3% has no measurable effect upon the tensile strength or modulus of the stock.

It is of course impossible to justify excessive amounts of coarse material in a pigment. These data do, however, make it evident that grit is by no means as objectionable

as common opinion indicates in regard to its effect upon the stress strain curve and particularly the tensile strength.

When poor results are obtained from gas black mixes it is probable that other factors are responsible. Notable among these is poor pigment dispersion. It has been pointed out by Endres (*loc. cit.*) that pigments are often in



the rubber in an unwet condition existing as large masses. These break up and form points of weakness when the rubber is stressed. Many precipitated pigments are difficult to wet and to disperse properly in rubber and give tensile results which are lower than might be expected from their state of division. Lithopone is a notable case and whiting and iron oxide are also offenders.

Due to the immense amount of surface to be wet the problem of complete dispersion of carbon black is by no means simple. The emphasis which has been placed upon efficiency in American rubber factories has so reduced the time available for mixing that perfect or even good dispersions have become more and more difficult for the factory operatives to obtain. It is probable that premature tread wear and tread cracking are frequently attributable to over-emphasis of the time consumed in the mixing operation and under-emphasis of the results obtained.

With these facts in mind it seems that tests concerning the degree of dispersion obtained in the mix would be more effective in insuring quality than tests directed toward the detection of small amounts of coarse material.

The Polish rubber footwear cartel, which disbanded last September because of misunderstandings as to price policy and production quotas, is reported to have been reorganized with the official title of "Centralne Biuro Sprzedazy Wyrobow Polskich Fabryk Obuwia Gumowego" (Central Sales Office of Polish Rubber Footwear Manufacturers). The cartel comprises the same manufacturers as before, except the firm "Schweikert," of Lodz, which has been replaced by the firm "Rygawar."

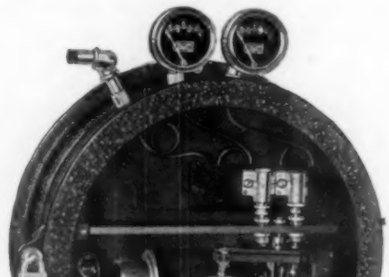
Timer for Individual Vulcanizers

A NEW controller for individual vulcanizers is the latest development to be offered tire and tube manufacturers by the C. J. Tagliabue Manufacturing Company, Brooklyn, N. Y. The company's recently issued Bulletin 1010 describes its construction and use.

Until recently cycle controllers or timers for individual tube and tire vulcanizers had the cam cut so that it started the cure at the zero mark, went through the complete cycle of operations, and having made a complete revolution, came back to zero at which point the clock was stopped. Obviously the length of cure was definitely fixed by the reduction gearing between the cam and the electric clock whose revolution time could not be altered. Also the timing of events was permanently decided by the contour of the cam. Changes in cure length were accomplished by substituting new gear wheels and changes in intermediate timing by recutting the cam.

Insistent demand for a quick and easy means of adjusting the timers in this respect and one which would not involve buying and waiting for new gears has now been met by the new Tagliabue fully adjustable timer which is constructed in the following manner.

Instead of an electric motor only capable of revolving counter-clock-wise a reversible electric clock is used which revolves counter-clock-wise during the first half of the cure, then reverses automatically and turns the cam clock-wise back to zero where it again reverses (so as to be ready for the next cure) and immediately stops. In this



Tagliabue Timer for Individual Vulcanizers

timer, it is possible to change the cure length in a few seconds time because it is only necessary to reset the reversing arm at the new time on the cam which is of course graduated in minutes. The reversing mechanism is extremely simple and an endurance run of many thousand repeated cycles testifies to its dependability. To make adjustment complete the period during which the tube is venting has also been made fully adjustable by having a separate cam sector (readily loosened, shifted and relocked) govern this operation. Those portions of the compound cam which govern the operation of the closing cylinder, locking cylinder, etc., do not require adjustment as the timing of these operations is always the same regardless of changes in the length of cure.

In this controller, a worm drive is used between clock and cam to eliminate the back-lash present in spur gearing. Ball bearings are used not only for the two worm shaft bearings but also for the cam spindle thus assuring perfect running at all times. A friction piece makes it possible to move the cam manually should this be desired.

Rubber Companies Report Deficits

PROFIT and loss deficits were practically universal among American rubber manufacturing companies for the year of 1930, even those reporting a net profit showing a deficit after dividends and other charges. For the first time in years, the results reported by the leading companies in the industry showed a combined net loss, only two of the four largest manufacturers being able to record any earnings before dividends.

As a group, the "Big Four" of the domestic industry show a net loss of $19,984,822 during the year 1930. These same four firms reported total earnings of $31,659,142 in 1929 and $10,631,626 in 1928.

Gross sales of all of the four largest companies declined last year, owing to the general business depression and the lower unit prices for rubber goods. The gross sales of the "Big Four" during 1930 totaled $636,409,197, a figure that is equal to 72.9 per cent of the $872,965,200 which the Rubber Manufacturers Association, Inc., estimates as the grand total sales value of all rubber goods shipped from American factories last year. In addition, therefore, to being fairly representative of the general condition of the industry in the United States, these figures show the process of concentration of the country's rubber business into a few companies going steadily forward, as the "Big Four" sales in 1929 were equal to only 66.1 per cent of the total domestic sales. The acquisition of another rubber company by one of the "Big Four" last year helped to increase this ratio, and it may be even further increased in 1931 through the purchase by another member of the group of two smaller tire firms.

As a result of the losses recorded last year, the combined profits of these four rubber manufacturers in the three-year period from 1928 to 1930 shrank to $22,305,946. This is equal to less than 1.06 per cent of their gross sales of $2,113,398,238, over the same period.

The accompanying table shows the relation of gross sales to profits for each of these four companies. The profits listed are those remaining after interest, taxes, depreciation of plant and equipment, adjustment of inventories and other charges have been deducted, but before preferred dividends have been met, and include any reserve which may have been set aside in the year in which such reserve was earned. The table gives the same figures for the last three years by way of comparison.

Despite the fact that these four companies showed a combined loss at the end of 1930, three of them paid out in dividends to common and preferred stockholders the sum of $22,999,923, which further increases their profit and loss deficits. Of these three firms, two have reduced their common dividend rate and one has omitted such disbursements altogether.

The United States Rubber Company is still experiencing unusual expenses in connection with its intensive effort to reorganize its manufacturing facilities completely. The company's operating profit last year was reduced to $6,505,672 as compared with $14,385,814 in 1929. Expenditures for new buildings and machinery alone amounted to $8,162,284, and there were heavy charges for depreciation and inventory adjustments. The company reduced the book value of its common stock by writing off the good will and patents account of $58,925,372 and a final deficit at the end of the year of $7,120,056.

In its report for 1930, the Goodyear Tire & Rubber Company showed net profits of $9,912,233, but this figure was arrived at only after appropriating $5,000,000 from reserves earned in previous years. If this reserve is disregarded, the company shows a total deficit of $7,527,658 after common and preferred dividends.

In spite of the acquisition of the Miller Rubber Company early last year, the B. F. Goodrich Company reported a loss in sales of 5.6 per cent. This kept Goodrich in third place in this respect, although it was thought at the time of the merger that the combination might be sufficiently strong to make Goodrich the second largest rubber company. Dividends and other charges in 1930 combined to reduce the company's surplus by a total of $16,847,246.

The fiscal year of the Firestone Tire & Rubber Company ends on October 31 and is not, therefore, absolutely comparable with the calendar year reports of the other three organizations. Its net profit of $1,541,034 was made after absorbing the expenses of establishing the company's battery business and setting up numerous one-stop service stations. The Firestone deficit after dividends was $4,570,189.

The Fisk Rubber Company, formerly listed in these tabulations, has been omitted because of its present receivership and the lack of final and complete financial reports for 1930. H. T. Dunn, president, in a statement last December estimated the total loss for the year at $6,700,000, which would compare with losses of $7,496,458 in 1929 and $8,791,251 in 1928. The General Tire & Rubber Company reported sales of $24,072,000 and profits of $732,597, or slightly over 3 per cent, and was the only major tire firm to cover its dividend requirements.

The Kelly-Springfield Tire Company showed a net loss of $3,796,054, the Lee Rubber & Tire Corporation a net loss of $799,111, and the Norwalk Tire & Rubber Company a net loss of $194,459. The Ajax Rubber Company, whose annual losses averaged over $2,000,000 in each of the previous three years, made no report for 1930, but defaulted on its bonds and has suspended operations, although its subsidiary, the McClaren Rubber Company, is continuing independently. The Seiberling Rubber Company showed a fiscal year loss of $1,282,098 and the Mohawk Rubber Company a 1930 loss of $668,698. The Intercontinental Rubber Company, a planting organization, had a net loss of $303,692.

The India Tire & Rubber Company reported an operating profit of $18,887, the Baldwin Rubber Company a net profit of $150,855, and the Faultless Rubber Company a net profit of $368,273 in its fiscal year. Raybestos-Manhattan, Inc., had a net of $1,156,770.

SALES AND PROFITS OF THE FOUR LARGEST RUBBER MANUFACTURING COMPANIES

(Profits shown are after interest and other charges, but before preferred dividends or reserves)

	1928			1929			1930			Three Year Total		
Company	Gross Sales	Profits**	Per Cent	Gross Sales	Profits**	Per Cent	Gross Sales	Profits**	Per Cent	Gross Sales	Profits**	Per Cent
U. S. Rubber	$193,480,121	$10,781,254†	....	$192,962,040	$ 3,378,412†¶	....	$157,074,060	$18,063,940†	....	$543,516,221	$32,223,606†	....
Goodyear	250,769,208	10,827,843	4.3	256,227,067	19,864,374	7.8	204,063,229	4,912,232	2.8	711,059,504	35,604,449	5.0
Goodrich	148,805,178	3,513,023	2.4	164,494,957§	7,446,310§	4.5	155,256,245‡	8,374,148†	....	468,556,380	2,585,185	.6
Firestone*	125,664,666	7,072,014	5.6	144,585,804	7,726,870	5.3	120,015,663	1,541,034	1.3	390,266,133	16,339,918	4.2
Total	$718,719,173	$10,631,626	1.3	$758,269,868	$31,659,142	4.2	$636,409,197	$19,984,822†	....	$2,113,398,238	$22,305,946	1.1

*Firestone fiscal year ends October 31. **Without deduction of reserves taken into income account. ¶Does not include $66,044 profit from plantations. †Loss. §Includes Hood Rubber Company and subsidiaries for four months. ‡Includes Miller Rubber Company from February 17, 1930.

EDITORIAL COMMENT

The Serious Predicament of the Plantation Industry

THE present condition of the crude rubber producing industry cannot be deemed a healthy one by even the manufacturing angle of the industry, in spite of the attractiveness of the current prices of the raw commodity. Unhealthy conditions in any industry can easily spread epidemics in their associated industries. The repercussions of rubber selling at below 7 cents may bring serious results. One of the characteristics of rubber is that it bounces, and the manufacturing industry, better termed, the consuming industry, should not be too long blind to the probabilities of a rebound.

Interesting comments are coming from the British plantation interests, which show the desperateness of their situation and the extent to which they will go to adjust conditions. Commenting on the breakdown of the Anglo-Dutch negotiations, Zorn & Leigh Hunt say:

"It can safely be assumed that whatever the outcome of these discussions, the price of rubber will not remain in the region of 4d. per pound. This is probably the worst possible level for the raw material, in the sense that it is too low to permit the earning of dividends, and not low enough to bring about any heavy decrease of production. In other words, those estates which continue to produce maximum crops can show a smaller loss at this price than would be the case if they curtailed or ceased tapping altogether. Paradoxical as it may seem, it would be a far better thing for the industry as a whole if rubber dropped to, say, 3d. per pound, as it would then be uneconomic for plantations to continue tapping operations on their present scale. It is still hoped that the respective Governments will be prevailed upon to impose a compulsory plan of restriction, but failing this matters may take a course which (if temporarily unpalatable) will lead to an early adjustment of the position."

One of the most forceful comments in connection with the situation of the plantation industry recently came from Sir Herbert Wright, when, as chairman, he addressed the meeting of the Java Amalgamated Rubber Estates, Ltd., in the following words:

"Producers have to acknowledge (1) that world stocks are growing at enormous rates, the surplus having increased during the last eighteen months by quite 200,000 tons; (2) supplies are, despite a prolonged period of low prices and reduction of output by some estates, still increasing; (3) before long large native acreages planted in Sumatra during the Stevenson Restriction Scheme and other areas planted later with budded stock by Europeans will be tappable; (4) furthermore, many rubber manufacturing concerns are, as you know, running short time; and (5) improved processes in manufacture are giving a longer life to tires and other rubber manufactured articles. The position is, therefore, without question very serious indeed. One must realize that in the absence of either a very large increase in demand for or reduction in crops of raw rubber our commodity may become unsaleable. Even today most estates are using up their bark, which is their real asset, and paying cash for the privilege of doing so. We did this on your properties last year, and it looks extremely likely that we shall do it again. I can assure you, if your balance sheets do not already disclose it to you, that but few estates under European control are with today's prices making a profit.

"We can not see the sense in continuing business on these lines. I, and I think my colleagues, have consistently advocated, and are still definitely in favor of, reducing output in all rubber producing areas, in order that a price can be obtained sufficient to keep the planting industry solvent. To continue producing excess crops in face of the knowledge we possess is not business. Why should we as growers refuse to do what manufacturers have already done; that is, reorganize our business so that our productions can be sold at a reasonable profit? To continue trading at a loss is impossible, not merely for us, but for everybody, and a continuation of present prices will, in fact, mean that some companies will soon come to the end of their cash resources. I am a director of some companies which have stopped tapping a part or the whole of their properties. The directors of such concerns are faced with the policy of giving a prolonged rest to their trees, or alternatively letting their estates out to native tappers on a basis which will not involve the company in loss. Those who adopt the former policy are maintaining the potentiality of the estate at a rather costly figure; those who adopt the second policy are adding still further to the supply of unwanted rubber."

The RUBBER AGE

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General Manager.....PETER P. PINTO
Managing Editor.....J. P. BUSHNELL
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Representatives in all the rubber centers of the United States, Canada, England, France, Germany and the Middle East.

The Rubber Industry's CURRENT NEWS

Financial—Personals—New Rubber Products—
Building Operations—Manufacturing—Exports

CHICAGO RUBBER GROUP ANNUAL MEETING MAY 8

Members of the Chicago Rubber Group of the Rubber Division, American Chemical Society, will hold their first annual meeting on Friday evening, May 8, at the Steuben Club, 188 West Randolph street, Chicago, Ill. Use of the club swimming pool will be available to the members until 7 p. m. Dinner will be served at 7 p. m., with the meeting program starting promptly at 8 p. m.

Two papers will be presented on the manufacture of hard rubber, one by Harold Bluhm and the other by A. H. Voss. At this meeting, new officers will be elected and an unusually fine entertainment program offered.

One report of marked interest will be an announcement concerning arrangements for new permanent quarters for the Chicago Rubber Group. This is the first time a Rubber Group has arranged for a permanent home, and Chicago members are urgently requested to attend this meeting to hear of this and other plans for the future.

Reservations for the dinner at $1.50 per plate should be sent to the secretary, B. W. Lewis, at Wishnick-Tumpeer, Inc., 365 East Illinois street, Chicago, Ill.

RUBBER MEN SPEAK AT OHIO SAFETY CONGRESS

Akron rubber engineers took a prominent part in the All-Ohio Safety Congress, held at Columbus from April 21 to 23. A. P. Regal, process engineer of the Philadelphia Rubber Works Company, acted as chairman of the rubber group meetings on April 21 and 22.

Oscar Carlson, foreman in the tire building room, plant No. 2, of the Firestone Tire & Rubber Company, spoke on "How Far Can a Foreman Go?" Lieutenant Rolland G. Mayer, inspector in charge of dirigible construction at the Goodyear-Zeppelin Corporation, discussed "Peculiar Safety Problems in Zeppelin Construction," and a motion picture on the building of the U. S. S. Akron was shown under the auspices of the Goodyear Tire & Rubber Company.

"Some Observations on Plant Cleanliness and Order" was the subject of a discussion by Harry G. Westbrook, assistant superintendent of the Ohio Insulator Company, and "Safety in Engineering" was the topic treated in a talk by E. A. Hoener, chief engineer of the Firestone Tire & Rubber Company.

Navy Plane Pilot Adrift Five Days in Rubber Boat

After spending five days without food precariously afloat in his rubber life boat, followed by hungry sharks, Chief Aviation Pilot Verne Warren Harshman of the United States Navy was picked up on the afternoon of March 23 by the Hamburg-American ship Cerigo off the coast of Colombia.

He had become lost from the rest of the fleet during flying manoeuvres off Panama on March 17 and, after making scouting circles in vain, ran out of gasoline and was forced to land on the ocean. The flotation gear on his plane failed after seven hours of floating, and he took to his rubber life boat.

General Motors Orders Rubber

According to newspaper reports, the General Motors Corporation has placed orders for its requirements of rubber, cotton, copper, tin and zinc for the remainder of the 1931 production season. The orders, it was said, totaled many millions of dollars. The company frequently anticipates its requirements of materials, depending on the status of the market in each commodity, but its action in ordering all of its needs in five basic commodities more than eight months in advance was said to be without precedent.

American Hard Rubber Expands

The American Hard Rubber Company will expand its plant at Butler, N. J., by the erection of a single-story building, 92 by 300 feet in size, at a cost of approximately $150,000. The building will be of brick and steel construction and will provide employment for between 100 and 150 men for a number of months. It will be located on Boonton Avenue on the area now occupied by the factory of the Farrell Box Company, which has moved to Bloomfield.

New Scrap Rubber Firm

The Detroit Metal & Rubber Company, Detroit, Mich., has been incorporated to handle scrap rubber and scrap metal and to manufacture batteries. The incorporators are William Hamlin, 1610 Gillet Street, Max Harris and Herman Aberly.

NEW YORK RUBBER GROUP PLANS TO MEET MAY 20

Members of the New York Group of the Rubber Division, American Chemical Society, will hold their next dinner and meeting on May 20 in the club rooms of the Building Trades Employers Association, 2 Park Avenue at 33rd Street, New York City. The program will consist of papers by A. R. Kemp, of the Bell Telephone Laboratories, and F. R. Davis, president of the Davis Emergency Equipment Company. Entertainment will also be provided during and after the dinner.

The new meeting place for the New York Rubber Group represents an entirely different type of quarters for these sessions, comprising a large library, game room, lounge and dining hall. These facilities will be available for use by members of the group prior to the actual meeting.

Further details as to the topics of the papers to be presented and other features of the meeting will be announced in the near future.

L. H. HOAG NOW WITH SPADONE MACHINE CO.

L. Harry Hoag, former advertising manager of *India Rubber World*, became associated this month with the Spadone Machine Company, 15 Park Row, New York City. This firm has for many years supplied the rubber industry with its well known lines of Bias Cutters, Hose Making Machines, Press Cleaning Machines and Bronander Variable Speed Units.

In addition to these lines, the Spadone organization will now act as sole distributors in the United States and Canada for the Rhoades Metaline Oilless Bearings and Bushings for use with pulleys, hangers, journals and in many other installations wherever oil drips are detrimental to raw materials. These bearings are self-lubricating, requiring no oil. Besides a number of applications in the rubber industry, they are in use in practically every field of manufacture.

Goodrich Annual Meeting May 6

B. F. Goodrich Company stockholders will hold their annual meeting in New York City on May 6. The terms of the following directors of the company expire: C. C. Goodrich, Frank H. Mason, Wesson Seyburn, Albert A. Sprague, T. B. Tompkinson and V. I. Montenyohl.

A. S. T. M. PLANS EXHIBIT OF TESTING APPARATUS

For the first time in its history the American Society for Testing Materials will sponsor an exhibit of testing apparatus and machines in conjunction with the annual meeting of the society at the Stevens Hotel, Chicago, Ill., from June 22 to 26. The exhibit is limited to equipment and apparatus used in the testing of materials and products, and recording and control equipment which is used in testing will be shown.

Testing machines of all types, metallographic and optical equipment, certain chemical and physical testing equipment, and specialties—sieves, pyrometric apparatus, fatigue machines, etc.—will be displayed. The society's committees will show apparatus developed for special tests, and government, institutional and private laboratories are expected to participate by exhibiting specialized equipment, not commercially produced, but designed for some specific test or determination.

JORDAN TO AID LALLEY; BARRY HEADS KELLY SALES

John J. Jordan, former general sales manager of the Kelly-Springfield Tire Company, has been advanced to the position of assistant to the president, which will enable him to devote more time in assisting W. H. Lalley, recently elected president of the company, in his duties. Mr. Jordan has been associated with the industry for over 20 years and with Kelly-Springfield for the past eight years.

A. W. Barry succeeds Mr. Jordan as general sales manager. Mr. Barry, manager of the truck and bus tire sales division since 1929, has been with Kelly-Springfield for 17 years, serving as manager of several branches, district sales manager, and supervising sales to automotive manufacturers.

Frank B. Byron becomes assistant general sales manager. Since 1924, Mr. Byron has been eastern district sales manager, and has been a member of the Kelly-Springfield sales organization for over 18 years.

Firestone to Close Two Weeks

Factory workers of the Firestone Tire & Rubber Company have been notified that the company plants at Akron will close down for two weeks beginning July 13. Ten-year men entitled to vacations of two weeks will take them at that time. Five-year men will take two weeks off and receive one week's pay, while other factory employes will not be paid for any part of the two weeks.

B. F. White

B. F. White, for 15 years a member of the sales organization of the Firestone Tire & Rubber Company, died at the home of his mother in New London, O., on April 4. Illness had forced Mr. White's retirement from the Firestone company in 1926 after he had served as branch manager in various districts and in other sales positions. He was 54 years old.

Samuel Woolner, Jr.

Samuel Woolner, Jr., president of the Rubber Manufacturers Association, Inc., and president and chairman of the board of the Kelly-Springfield Tire Company until his retirement last month, died April 13 at his home in New York City. He was 64 years old.

A native of Louisville, Ky., Mr. Woolner was educated in the schools of that city and of Peoria, Ill. He began his business career with the Peoria Grape Sugar Company and later went into the distilling business, becoming president of the Woolner Distilling Company, of Peoria. From 1894 to 1898 he was a director of the Merchants National

Bank of Peoria. In 1920 he came to New York, intent on retiring from active business, but in January, 1923, began his association with the Keily-Springfield Tire Company, being elected to the board of directors on November 5 of that year. On November 18, 1924, he was chosen chairman of the board of directors, and on July 2, 1925, was elected president of the company to succeed Arnold L. Scheuer. Mr. Woolner was named treasurer of the Rubber Manufacturers Association in 1926 and was elected president in 1930 and reelected in 1931.

Always active in civic affairs while in Peoria, Mr. Woolner was made president of that city's Board of Trade in 1898 and during 1918 and 1919 served as president of the Peoria Association of Commerce. He was Food Commissioner of Peoria County during the World War and also chairman of the county's Council of Defense. He was one of the Illinois Commissioners to the Panama-Pacific International Exposition at San Francisco in 1915.

Mr. Woolner was also for many years important in the political life of Illinois, acting as a delegate from that state to every Democratic National Convention from 1896 to 1912. In the convention of 1896, when the free silver platform was announced, Mr. Woolner, a staunch "gold Democrat," supported Senator David B. Hill in his minority report. With other delegates he walked out of the convention and assisted in the campaign of Palmer and Buckner, nominees of an independent Democratic ticket. When Alton B. Parker was nominated in 1904 and Woodrow Wilson in 1912, Mr. Woolner served on the notification committee.

TAX BUREAU REPORTS 1929 COMPANY PROFITS

According to a preliminary report of the Bureau of Internal Revenue, there were 623 tax returns from American rubber corporations for 1929, of which 22 were reported as inactive. Of the others, 310 reported gross income of $914,378,457 and net income of $55,909,400, while 296 showed gross income of $508,893,810 and a total deficit of $38,848,623.

For 1928, the bureau received 723 returns from domestic rubber firms, including 43 which were inactive. Of the remainder, 349 reported gross income of $932,047,622 and net income of $44,644,531, while 331 showed gross income of $454,121,683 and a total deficit of $45,987,216.

Garlock Earned $442,966

The Garlock Packing Company, Palmyra, N. Y., reports for the year ended December 31, 1930, net profit of $442,966, after interest, amortization, federal taxes and other charges, equivalent to $2.10 a share on 201,645 shares of no-par stock. In 1929, net profit, including earnings of a subsidiary company acquired April 19, 1929, was $814,126, or $4.03 a share.

Dayton Rubber Profit Higher

Earnings of the Dayton Rubber Manufacturing Company, Dayton, O., for the first quarter of 1931 were substantially above those of the corresponding period of 1930, according to J. A. MacMillan, president. The company was scheduled to increase its output in the latter part of April after starting the month with no change from its March schedule of 60 per cent of capacity.

Rubber Stocks Again Drop

With the entire market sinking to the lowest levels since last December, rubber company securities could not withstand the bear pressure and closed the fortnight lower. A revival of the Goodyear-U. S. merger rumors had little effect, as did a General-Goodrich consolidation report. Expectation that Goodrich may pass its preferred dividend caused that issue to drop 20 points. Closing stock prices on April 20 compare as follows:

	Last Price		—1931—	
	Apr. 20	Apr. 7	High	Low
Aetna	—	—	5	3⅜
Ajax	—	—	⅛	⅛
American Hard Rubber		—	35¼	30
Dayton "A"	—	—	—	—
Falls	—	—	—	—
Faultless	—	—	37	35
Firestone	—	16½	19¾	16
do. 6% pfd.	60	60¼	63	56½
Fisk	⅝	⅝	⅞	½
do. 1st pfd.	2	2½	3	2
General	—	97	140	81
do. pfd.	—	—	87½	83
Goodrich	13½	16	20⅞	13¼
do. pfd.	40	—	68	40
Goodyear	42⅝	43¾	52¾	38⅝
do. 1st pfd.	82¾	86	91	81
India	13	12	13½	8⅝
Intercontinental	—	—	4½	2
Kelly-Springfield	2	2½	3½	1⅝
do. 6% pfd.	—	41	45	35
Lee	—	4½	4⅝	3½
Mohawk	6	—	8	3
do. pfd.	—	—	35	35
Norwalk	1	—	1½	½
Pirelli	—	35⅛	39⅜	31⅞
Raybestos-Manhattan	—	25⅞	29½	18⅝
Seiberling	—	5¼	7½	4⅜
do. pfd.	—	—	40	33
U. S. Rubber	15⅞	16⅜	20⅝	11⅜
do. pfd.	26¾	—	34¾	20⅝

GERMAN RUBBER EXPORTS OFF 13 PER CENT IN 1930

The economic depression, low market price of crude rubber, keener competition, and additional tariff barriers which caused a decline during 1930 in the other principal rubber-exporting countries were all responsible for a decreased export trade of Germany in rubber goods for that year—to a value of $27,163,400, a decline of 13 per cent from the high record, $31,287,100, of 1929. This decrease was principally the result of a lower volume of business, accompanied in most instances by lower prices for miscellaneous soft and hard rubber specialties—the leading export item. Exports of soft rubber specialties declined to a value of $8,736,900 in 1930 from $10,493,800 in 1929, and hard rubber specialties to $2,185,200 from $2,818,600. The next important item among exports is that of automobile casings, which decreased to $5,218,700 from $5,584,200.

The rapid increase in German production and exportation of rubber goods since the World War—the year 1929 exceeding the pre-war year of 1913 for the first time—and the decided decline in Canadian exports during 1930 have enabled Germany to supplant Canada as the third leading rubber-goods exporting country. Germany now ranks behind the United Kingdom, which is in second place, and the United States—the foremost exporting country of rubber products.

Germany's large export trade in hard and soft rubber sundries and novelties has been sharply cut down by protective tariff legislation in countries which were formerly important consumers. German tire exporters managed to increase the volume of their exports by 0.3 per cent in 1930, although the value of shipments dropped. German exports of rubber boots and overshoes jumped from 1,086,900 pairs, valued at $592,400, in 1929, to 1,716,882 pairs, worth $1,069,800, in 1930. Rubber hose and belting exports also showed a volume increase last year, but a decline in value.

Foreign rubber goods exporters are still able to sell in Germany, but recently the import trade has been decreasing—to a value of $8,475,900 in 1930 from $9,521,900 in 1929, a decline of 11 per cent. The most important item is automobile casings, valued at $3,825,400 in 1930. Second in importance is boots and shoes, with a total value of $1,116,200.

Spencer Moulton Earns $214,500

The annual financial statement of George Spencer Moulton & Company, British rubber manufacturer, for the year ended December 27, 1930, shows a net profit of £44,089, or approximately $214,500. This compares with earnings of £64,155 in the previous year.

Australian Goodyear Profits

The Goodyear Tyre & Rubber Company (Australia), Ltd., has reported for the year ended December 31, 1930, a net profit of £83,595, or approximately $407,000. This represents a decrease of £165,761 from the earnings reported for 1929.

James Lyne Hancock Expands

James Lyne Hancock, Ltd., rubber proofers and manufacturers since 1820, are expanding their London factories by the addition of new equipment. Among the machinery being added to their plant are new spreading machines, doubling calenders, chalking and brushing machines and other modern equipment for the production of all classes of single- and double-texture fabrics on a large scale.

To Exhibit Goldenrod Rubber

Thomas A. Edison and Henry Ford will co-operate in an exhibit of goldenrod rubber at the World's Fair at Chicago in 1933. A contract for an exhibit of the production of rubber from goldenrod was signed by Mr. Edison at Fort Meyer, Fla., early this month, with Mr. Ford acting as a witness.

André J. Michelin

André Jules Michelin, head of the Societe Michelin et Cie., foremost French tire manufacturer, died at his home in Paris on April 4 at the age of 78. Born in Paris on January 16, 1853, M. Michelin took courses at the Ecole Centrale, being graduated as an engineer, and later joined his brother, Edouard, in manufacturing iron framework. It was in 1888 that the two brothers took over the Barbier-Daubree rubber works, founded 50 years earlier by their grandfather, Edouard Daubree, at the suggestion of his wife, the niece of the Scotch scientist, Mackintosh.

The Michelin brothers were successful in

improving the first pneumatic tires and the methods of attaching these tires to the rims of bicycles, their first notable success being in a Paris-Brest road race in 1891, in which a cyclist using their tires won by a margin of more than eight hours. They also pioneered in the development of pneumatic tires for the infant automobile industry, attaining prominent recognition by driving their own car to victory in the Paris-Bordeaux race in 1896.

The Michelin plant at Clermont-Ferrand grew with the rise of the automobile, and branch factories were established in other countries. The Michelin Tire Company, an American subsidiary, established a plant at Milltown, N. J., in 1907, which operated steadily until last year, when conditions in the industry forced its closing.

M. Michelin was enthusiastic about aeronautics and was president of the Aero Club of France. In the first week of the World War he offered $200,000 in prizes for heroic deeds by French aviators without distinction of rank. Previously he had been interested in the experiments carried on in France by Wilbur Wright and he donated the Michelin Cup for aviation contests. He founded and maintained several French charitable organizations, and he created the Tourist Guide organization and arranged for the placing of the milestones and signposts, which today line all the French national highways.

C. T. Wilson to Move

The Charles T. Wilson Company, Inc., dealers and brokers in crude rubber and foreign produce, will move on May 1 to new quarters at 99 Wall Street, New York City. The firm is at present located at 44 Beaver Street.

Closing Prices on Rubber Exchange of New York, Inc.

FROM APRIL 6 TO APRIL 18, 1931

		Spot	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Sales
No. 1 Standard Contract of 10 Tons															
Apr.	6	6.70	6.70	6.77	6.88	7.00	7.10	7.20	7.28	7.36	7.45	7.60	7.68	7.77	3
	7	6.60	6.50	6.63	6.72	6.81	6.91	7.02	7.12	7.22	7.32	7.42	7.50	7.60	218
	8	6.70	6.55	6.70	6.81	6.92	7.02	7.12	7.21	7.31	7.41	7.51	7.60	7.70	53
	9	6.72	6.55	6.75	6.83	6.92	7.03	7.14	7.23	7.33	7.43	7.52	7.61	7.70	58
	10	6.70	6.55	6.61	6.71	6.81	6.91	7.00	7.10	7.20	7.32	7.40	7.48	7.58	45
	11	6.72	6.56	6.66	6.75	6.85	6.95	7.05	7.15	7.25	7.36	7.46	7.56	7.65	4
	[illegible]	[illegible]	6.55	6.66	6.77	6.90	7.00	7.10	7.20	7.30	7.38	7.48	7.56	7.63	140
	14	6.65	6.60	6.65	6.75	6.85	6.95	7.05	7.15	7.25	7.35	7.43	7.51	7.60	44
	15	6.60	6.50	6.59	6.68	6.78	6.87	6.97	7.08	7.17	7.26	7.34	7.43	7.51	33
	16	6.50	6.40	6.51	6.61	6.70	6.79	6.89	6.96	7.03	7.16	7.25	7.33	7.43	113
	17	6.44	6.35	6.40	6.49	6.58	6.66	6.75	6.84	6.92	7.03	7.12	7.21	7.30	46
	18	6.36	6.20	6.25	6.36	6.48	6.56	6.64	6.72	6.80	6.89	6.98	7.09	7.18	39
Old "A" Contract of 2½ Tons															
Apr.	6	——	6.40	6.60	6.70	6.80	6.90	7.10	7.20	7.30	7.40	7.55*	7.63*	7.72*	8
	7	——	6.40	6.50	6.60	6.70	6.80	6.90	7.00	7.10	7.20	7.40*	7.48*	7.58*	309
	8	——	6.40	6.60	6.70	6.80	6.90	7.00	7.10	7.20	7.30	7.46*	7.55*	7.65*	32
	9	——	6.40	6.70	6.80	6.90	7.00	7.10	7.10	7.20	7.30	7.47*	7.56*	7.65*	9
	10	——	6.50	6.50	6.60	6.70	6.80	6.90	7.00	7.10	7.20	7.37*	7.45*	7.54*	76
	11	——	6.50	6.60	6.70	6.80	6.90	7.00	7.10	7.20	7.30	7.41*	7.51*	7.60*	4
	13	——	6.50	6.60	6.70	6.80	6.90	7.00	7.10	7.20	7.30	7.45*	7.51*	7.58*	42
	14	——	6.50	6.60	6.60	6.80	6.90	6.90	7.00	7.10	7.20	7.38*	7.46*	7.55*	37
	15	——	6.40	6.50	6.50	6.70	6.80	6.80	6.90	7.00	7.10	7.31*	7.40*	7.47*	28
	16	——	6.30	6.40	6.40	6.60	6.70	6.80	6.90	6.90	7.00	7.22*	7.30*	7.40*	184
	17	——	6.30	6.30	6.40	6.50	6.60	6.60	6.70	6.80	6.90	7.07*	7.16*	7.25*	66
	18	——	6.10	6.20	6.30	6.40	6.50	6.50	6.60	6.70	6.80	6.95*	7.05*	7.14*	80

*New "A" Contract.

Names in the News

D. F. CRANOR, of the Service and Control Department of the Binney & Smith Company, New York City, presented a paper entitled "An Outline of the Manufacture of Carbon Black" before the Paint and Varnish Superintendent's Club of the Philadelphia District on April 9. The paper was prepared by Dr. Cranor in collaboration with L. J. VENUTO, also of the Binney & Smith Company.

C. A. CAPRON, general foreman of the calendering division of the B. F. Goodrich Company at Akron, spoke before the members of the company's processing division on April 4 at a steak roast held in his honor at Rex Lake. Mr. Capron, who had just returned from the Orient, told of the exceptional progress in the manufacture of tires in the Goodrich Japanese plant, which now has a daily output of 250 casings.

W. F. LUND, of the comptroller's office of the United States Rubber Company, will lead a discussion of multiple location floater insurance at the conference of the insurance division of the American Management Association to be held at the Palmer House, Chicago, Ill., from April 27 to 29.

T. G. GRAHAM, first vice-president of the B. F. Goodrich Company, is recuperating from an operation for appendicitis at the City Hospital, Akron, O., on April 6.

C. W. SEIBERLING, vice-president of the Seiberling Rubber Company, was reappointed to the board of trustees of Springfield Lake Sanatorium for a three-year term at a meeting of county commissioners on April 1.

H. E. COOK, general superintendent of the engineering departments of the B. F. Goodrich Company, spoke at a dinner and entertainment of the engineering supervisory force of the company, held April 13 at the Breathnach Country Club. C. T. BUTLER, staff superintendent of engineering, acted as toastmaster.

V. R. JACOBS, aeronautical sales manager of the Goodyear Tire & Rubber Company, spoke before a meeting of the Cleveland Section, Society of Automotive Engineers, held at the Firestone Clubhouse in Akron on April 20. JOHN L. COHILL, newly named vice-president and general manager of the Argentine subsidiary of the Firestone Tire & Rubber Company, addressed the group on "Transportation Abroad."

P. J. KELLY, advertising manager of the B. F. Goodrich Company, spoke before members of the Akron Shrine Club on April 3. He explained the reasons that led the Goodrich company to sponsor the Silvertown Safety League in an effort to reduce traffic fatalities.

JOHN L. COHILL TO HEAD FIRESTONE OF ARGENTINA

John L. Cohill has been named vice-president and general manager of "Firestone de la Argentina, S. A." to take charge of the Firestone Company's operations in Argentina, where the latest Firestone plant is now nearing completion, according to announcement of Harvey S. Firestone, Jr., vice-president of the Firestone Tire & Rubber Company and president of the new Firestone South American company.

Mr. Cohill has been assistant export manager of the Firestone Tire & Rubber Company for the last five years. He has just left Akron to take up his new duties.

J. L. COHILL

Mr. Cohill served with distinction during the World War as an officer in the Canadian and British armies both in France and the Far East. He came to Firestone Akron headquarters six years ago, after spending five years in India with Firestone distributors. While making Akron his headquarters he has traveled extensively and recently returned from a 28,000-mile trip to 18 countries in Africa and Europe.

The new Firestone plant is expected to open for production May 1. It is located at Llavallol, near Buenos Aires, on the main paved highway leading to Buenos Aires from Eccheverrea, and also on the main line of the Southern Railroad, one of the most important railroads in the Argentine. It is extremely well located from a standpoint of labor supply, transportation, and availability of power and water supply. The site was selected by Mr. Firestone, Jr., when he made a trip for this puprpose last Fall.

The American operating staff, consisting of engineers and production men from the Firestone Akron and California plants, left recently to begin training local working forces in Firestone tire building, a new industry for the enterprising southern neighbor republic.

H. KILGORE, chief draftsman in the engineering departmenet of the Goodyear Tire & Rubber Company, has been appointed chairman of the engineering committee of the Rubber Section, National Safety Council. He succeeds C. B. MITCHELLA, general manager of the Adamson Machine Company, who resigned several weeks ago.

SYDNEY L. PLANT, former president of the Plant Rubber & Asbestos Works, San Francisco, Cal., and now a manufacturers' representative in that city, sailed last month for a vacation trip of several months in the South Sea Islands.

R. P. DINSMORE, chief chemist of the Goodyear Tire & Rubber Company, left Akron on April 18 for a three-week visit to Goodyear's plant at Los Angeles, Cal.

GEORGE D. WORTHINGTON, tire department sales manager for the United States Rubber Company in South Africa, is now attending the tire repair school of the United States Rubber Company in Detroit, Mich. Among other representatives of foreign countries also studying American methods of tire and car servicing at the school are EDUARDO DOVAL, whose father operates the American Garages in Havana, Cuba, and JOHN KRAG, sent to this country by Krag & Ekfelt, tire distributors of Oslo, Norway.

A. F. STEEVES, of the Farrel-Birmingham Company, Ansonia, Conn., acted as chairman of the publicity committe for the first annual Connecticut Safety Conference, held at the Hotel Taft, New Haven, Conn., on April 14. T. W. WALKER, of the Goodyear India Rubber Glove Company, Naugatuck, Conn., served as a member of the program committee.

HERBERT S. KREIGHBAUM, for 17 years connected with the law department of the Goodyear Tire & Rubber Company, has opened an office for the private practice of law at 413 Akron, O. The opening of a branch office in Cleveland in association with a firm of attorneys from New York and Rio de Janeiro is also being planned by Mr. Kreighbaum.

SAM G. BROERS, vice-president and general manager of the Firestone Tire & Rubber Export Company, has been made chairman of the foreign trade committee of the Akron Chamber of Commerce and president of the Akron Export Club, succeeding JOHN L. COHILL, who has left Akron to manage Firestone's Argentine plant.

W. C. YOUNG, aeronautical engineer of the Goodyear Tire & Rubber Company, spoke before the members of the American Legion Luncheon Club at Kaase's Cafe, Akron, O., on April 16. He discussed efforts being made to solve air problems.

Rubber Goods and Specialties

Sermold Sport Shoe

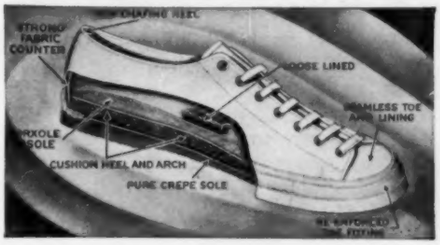
One of the new patterns in the sport shoe line of the Servus Rubber Company, Rock Island, Ill., is the Sermold. This is distinguished by its rugged construction, attractive appearance and exceptional foot-fitting last. The upper is of heavy grey duck and the trim includes grey imitation leather back-

stay, lace-stay, ankle patch and saddle strap. Grey dual foxing and the heavy pebbled finish rubber toe cap are other features. The sole is of grey molded rubber of an original design including the company's name in large letters, which is said to give unusual wear and traction. The shoe is of a lace-to-toe pattern and includes a special counter, arch reinforcing saddle straps and Keneva non-heat insole. It is completed with white eyelets and laces.

Vulco Car Heater Hose

Car heater hose is subjected to severe use because of the hot water, steam, and anti-freeze solutions circulating through the hose. To meet the need for a high grade hose of this type, the Gates Rubber Company, Den-

ver, Col., is offering Vulco car heater hose of the same quality as its Vulco radiator hose. It is made in ⅝-inch size, three-ply construction, coiled and wrapped in 50-foot lengths and also in longer lengths, if desired by dealers. The one size fits all standard hot water heaters.



Court Special Shoe

The Converse Rubber Company, Malden, Mass., is featuring the Court Special tennis shoe among its line of Skoots. Features of the shoe are its non-chafing heel and seamless toe and toe lining. The Korxole insole is soft, springy and insulating, and the inner lining is loose to allow free circulation. The cushion heel and arch are so built as to absorb the shocks of strenuous play. The pure crepe sole is claimed to supply perfect traction for both clay and grass courts. Other details of construction include reinforced toe foxing and a strong fabric counter. The 11-ounce duck uppers are strong, sturdy and easy to clean.

New G & J Tire Line

A new line of G & J tires, featured by an all-over non-skid traction tread and containing more rubber content than the line it replaces, has just been announced by the G & J Tire Company, Indianapolis, Ind., subsidiary of the United States Rubber Company. The new line is comprised of four items—the Super-Stalwart, a six-ply heavy duty tire; the Stalwart, a first quality four-ply tire; the Endurance, a standard grade in the low-price field; and the Stalwart Heavy Service, a tire for trucks and buses. The new Stalwart line is built with a tread especially designed for long wear, with a sub-tread so constructed as to prevent "heel and toe" wear. This sub-tread supports the regular tread and insures slow, even wear. It has rigidly buttressed shoulders reinforcing the tread and insuring traction in mud and sand. There are three rider strips, providing easy steering and free rolling. A centre tread pattern gives a firm grip on the road. More rubber is built into this improved tire than has been customary in the past, while the web-cord process of construction provides a strong, yet flexible sidewall. The Super-Stalwart is identified by a thin gold stripe on the sidewall.

Dayton Ritz Tire

The Dayton Rubber Manufacturing Company, Dayton, O., has recently introduced the Ritz tire, at present made only in the 4.75-19 size. The sidewalls of the casing are white, and it has a jet black tread with fluted supports. It is of six-ply construction with a special tread design.

Chieftain Sport Shoe

The Chieftain is an addition to the line of the Firestone Footwear Company, Boston, Mass., designed for the purpose of furnishing a sport shoe in the low-price class with many of the features of much higher priced styles. The uppers are full height, made of enameline duck, and the sole is of dark red

rubber in a knurled design. Other features are a black ribbed toe cap, a red toe bumper, and a double-stitched ankle patch and back stay. The shoe is also made with a side stay for those who prefer it to the back stay. White, suntan or brown duck are the colors offered, with black trimmings and foxing throughout.

Essex Swimming Tube

Under the name of the World of Fun swimming tube, the Essex Rubber Company, Trenton, N. J., has introduced a companion bathing accessory to its World of Fun playballs. No pump is required, as the tube is very easily inflated with lung pressure. Merely rolling up the all-rubber valve and

tucking it in completes the operation and insures permanent buoyancy. This tube is manufactured in three sizes, either of which can be folded flat and inserted in a pocket or a beach bag. They are made in five different colors, solid and mottled, and are packed individually in attractive boxes for counter display.

DR. W. N. JONES SPEAKS ON RUBBER MACHINERY

Chemists, physicists and engineers still are faced with baffling problems, Dr. W. N. Jones, superintendent of the processing division of the B. F. Goodrich Company, told members of the firm's management group at a dinner meeting April 2 at Polsky's Tea Room in Akron. "The development of machinery to process rubber is almost as fascinating as the development of new compounds," he asserted. "In recent years the rubber industry has contributed some of the most unique machines in modern industry."

Dr. Jones illustrated his talk with exhibits of model machinery, describing the various equipment with which rubber is washed, dried, weighed, compounded with other materials, mixed, calendered or rolled, built into raw articles and finally vulcanized. "We use 36 grades of raw rubber, five kinds of pigments, and more than 300 kinds of chemical fillers and softeners," he concluded.

RUBBER MEN TO ADDRESS CHAMBER OF COMMERCE

The United States Chamber of Commerce will hold its 19th annual meeting at Atlantic City beginning April 28. Secretary of Commerce Lamont heads the government officials who will speak during the meeting, and P. W. Litchfield, president of the Goodyear Tire & Rubber Company, is among the industrial leaders who will address the general or group sessions.

Two foreign rubber leaders will address the delegates to the sixth congress of the International Chamber of Commerce at Washington, D. C., from May 4 to 9. On the morning of May 5, Alberto Pirelli, prominent Italian rubber manufacturer, will address a general session on the evolution and direction of trade, crises and their effect on the business structure. Thomas Bata, head of T. & A. Bata, leading rubber firm of Czechoslovakia, will speak at a general session on problems of production, regulation of employment and wages on the morning of May 6.

St. Joseph Lead Financing

A new issue of $10,000,000 5½ per cent convertible bonds, representing the first funded debt of the company, was approved this month by stockholders of the St. Joseph Lead Company, supplier of zinc oxides to the rubber industry. The proceeds will be used to reimburse the treasury in part for capital expenditures of nearly $22,000,000 over the past four years. The bonds, which are convertible into common stock at $33.50 a share, have been underwritten and offered to the public by J. P. Morgan & Co. at a price of 97½.

Laursen Wins Injunction

L. A. Laursen, inventor of the "water cure" process of curing tires, obtained an injunction on April 2 temporarily restraining Harry L. Lowe, of Eau Claire, Wis., and Attorney Willis Bacon, of Akron, from prosecuting a $399,500 suit for alleged royalties from the patent. The injunction was granted by Judge Arthur W. Doyle at Akron. Lowe, once an employe of Laursen in the Gillette Rubber Company laboratories at Eau Claire, claimed he was a partner in the "water cure" invention and had an oral contract for selling the process to rubber manufacturers.

"POTENTIAL DEMAND" IS PUT AT 89,500,000 TIRES

Tire manufacturers would be called upon to provide approximately 89,500,000 pneumatic and solid automobile tires during 1931 if potential tire requirements should be filled in the course of the year, according to an analysis of the industry by the Alexander Hamilton Institute. This would compare with actual factory shipments of less than 54,000,000 tires last year, but the survey states that it is highly improbable that actual shipments this year will come even close to equaling "potential requirements."

"During the past seven years prior to 1930," the Institute explains, "the average annual replacements amounted to 2.12 tires per car. The replacement demand in 1930 declined to 1.46 tires per car. This decrease can not be accounted for by excessive replacements in 1929, because replacements in that year amounted to only 1.89 tires." The curtailment in 1930, therefore, points to "an increase over normal in potential requirements," the survey concludes.

Sales of the India Tyre & Rubber Company (Great Britain), Ltd., have shown a steady increase thus far this year. January and February sales were 21 per cent higher than those for the first two months of 1930.

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Fisk on Five-Day Week

The Fisk Rubber Company, Chicopee Falls, Mass., resumed a five-day week schedule late last month with increased production of tires to meet seasonal demands. The firm had cut its working schedule from five to four days a week early in February.

Foote Bros. Moves Offices

The Foote Bros. Gear & Machine Company, Chicago, Ill., moved its general offices on April 6 from 111 North Canal Street to 215 North Curtis Street in that city. The move permits consolidation and better coordination of the general offices and manufacturing department.

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LATE MARKET PRICES

RUBBER—COTTONS AND FABRICS—CHEMICALS

NEW YORK, APRIL 20, 1931

RUBBER

Crude

PRICES for crude rubber at all centres again broke to new all-time record lows at the end of the fortnight just past. On April 20 the New York outside market sagged abruptly to close at 6⅛ cents a pound as compared to a price of 6½ cents for several days previous and to 6¾ cents a fortnight ago.

The lowest actual sale on the Rubber Exchange of New York was that of April deliveries on the old "A" contract at 5.80 cents a pound. The May delivery at London closed at 2⅞d, a price hitherto unheard of. The best Paras resisted the decline, but off grades were bid for as low as 4 cents a pound.

The trade showed disappointment over the March statistics revealing that rubber production was being maintained on estates. March output on estates over 100 acres was 18,913 tons in Malaya as against 18,779 tons in February. It was estimated that gross Malayan shipments would approximate 44,000 tons for April as against 48,000 tons in March and a little more than 41,000 tons in each of the two preceding months.

Prices quoted on the New York outside market at the close on April 20 follow:

Plantations—

Ribbed Smoked Sheets—			
Spot-Apr.	.06	@	.06¼
May-June	—	@	.06¼
July-Sept.	.06⅜	@	.06½
First Latex, crepe spot	.06⅛	@	.06¼
Amber Crepe, No. 2	.06	@	.06⅛
Amber Crepe, No. 3	.06	@	.06⅛
Amber Crepe, No. 4	.05¾	@	.06
Brown Crepe, Clean thin	.06	@	.06⅛
Brown Crepe, specky	.05¾	@	.06
Liquid Latex, per gal.	.75	@	.85

Paras—

Up-river, fine	.08¼	@	.08⅜
Up-river Medium	Nominal		
Up-river Coarse	.04	@	.06
Acre Bolivian, fine	.08⅝	@	.08¾
Caucho Ball, Upper	.04	@	.06
Islands, fine	Nominal		

Centrals—

Central scrap	.06	@	—
Esmeraldas	.06	@	—

Balata—

Block, Colombia	Nominal		
Block, Ciudad	.31	@	.31½

LONDON MARKET

Standard Ribbed Smoked Sheets—Buyers

Spot-Apr.		@	2 15/16d
May-June	2⅞	@	2 15/16d
July-Sept.	3	@	3⅛d

SINGAPORE MARKET

Standard Ribbed Smoked Sheets—Sellers

Spot		@	2¾d

Scrap

The market for rubber scrap continued to be depressed by the collapse of the crude commodity and by the comparative slackness in rubber factory operations. Reclaimers are preparing for production schedules well above the first three months of the year, and there is business for the scrap industry, although not at truly profitable prices. Late price quotations for the various grades follow:

(Prices to Consumer)

Auto tire peelings	ton	20.00	@21.50
Mixed auto	ton	9.50	@10.50
Bicycle tires	ton	7.00	@ 8.00
Clean solid truck tires	ton	26.50	@27.00
Boots and shoes	cwt.	1.10	@ 1.20
Arctics, untrimmed	cwt.	.75	@ .80
Inner tubes, No. 1	lb.	.04¼	@ .04½
Inner tubes, No. 2, compounded	lb.	.02⅛	@ .02¼
Inner Tubes, Red	lb.	.01⅞	@ .02
Air Brake Hose	ton	9.00	@10.00
Rubber Hose	ton	8.50	@ 9.00

Reclaimed

Rubber reclaiming plants increased their production schedules appreciably in March and are now running at even higher rates of output. Sales to manufacturers are holding up well, reclaim being bought for its own value as a compounding ingredient, and stocks should not increase appreciably. Late prices follow:

High Tensile			
Super-Reclaim Black	lb.	.06¾	@ .07
High Tensile Red	lb.	.06½	@ .06⅝
Shoe			
Unwashed	lb.	.05¾	@ .06
Washed	lb.	.07½	@ .07⅝
Tube			
No. 1 (Floating)	lb.	.08	@ .08¼
No. 2 (Compounded)	lb.	.06¾	@ .07
Tires			
Black	lb.	.05¼	@ .05½
Black, selected tires	lb.	.05½	@ .05⅝
Dark Gray	lb.	.06¾	@ .07
Light Gray	lb.	.07	@ .07⅛
White	lb.	.07½	@ .07¾
Truck, Heavy Gravity	lb.	.06	@ .06¼
Truck, Light Gravity	lb.	.06¼	@ .06½
Miscellaneous			
Mechanical blends	lb.	.04½	@ .05

COTTON and FABRICS

Cotton

UNLIKE crude rubber, raw cotton has maintained its price levels during the past fortnight. The closing price for middling uplands at New York on April 20 was 10.30 cents a pound, the same as two weeks previous, although during the period it fluctuated 15 points above and 15 points below that mark.

Failure of business conditions to improve is having a greater effect on cotton prices than crop prospects or any other factors. Takings by spinners have been decidedly less than a year ago, and the domestic stocks of cotton on March 31 are figured at 9,400,000 bales as compared to 6,976,000 at the close of March, 1930. In view of these figures, minor factors receive scant consideration and only a general improvement in business will be likely to cause improvement in the market.

The high, low and closing prices for the commodity on the New York Cotton Exchange on April 20 were as follows:

	High	Low	Close	Close
	April 20			Apr. 7
May	10.37	10.26	10.32	10.32
July	10.63	10.53	10.59	10.55
Oct.	10.97	10.87	10.95	10.62

Tire Fabrics

The situation in tire fabrics has remained unchanged. Prices continue to be fairly stable, but the demand has not been heavy in the general market. Late price quotations for the different grades of tire fabrics were as follows:

CORD			
Peeler, carded, 23/4/3	lb.	.34½	@ .34⅝
Peeler, carded, 23/5/3	lb.	.33	@ .33¼
Peeler, carded, 13/3/3	lb.	.30½	@ .30⅝
Peeler, carded, 15/3/3	lb.	.31	@ .31¼
Egyptian, carded, 23/5/3	lb.	.43	@ .43½
Egyptian, combed, 23/5/3	lb.	.47	@ .47½
CHAFERS			
Carded, American, 8 oz.	lb.	.26½	@ .27
Carded, American, 10 oz.	lb.	.26	@ .26½
Carded, American, 12 oz.	lb.	.25½	@ .26¼
Carded, American, 14 oz.	lb.	.25	@ .26
LENO BREAKER			
Carded, American, 8¼ oz.	lb.	.26	@ .32
Carded, American, 10¼ oz.	lb.	.26	@ .32
SQUARE WOVEN			
Carded, American, 17¼ oz. 23-11 ply	lb.	.33	@ .33½
Carded, American, 17¼ oz. 10-ply	lb.	.25	@ .25½

Sheetings

The sheetings market has not been particularly active, with most of the popular sizes showing fractional declines in prices at the end of the fortnight. The latest quotations were as follows:

40-inch, 2.50-yard	yd.	—	@ .07⅜
40-inch, 2.85-yard	yd.	—	@ .06¼
40-inch, 3.15-yard	yd.	—	@ .07⅜
40-inch, 3.60-yard	yd.	—	@ .06¼
40-inch, 3.75-yard	yd.	.05⅛	@ .05¼
40-inch, 4.25-yard	yd.	—	@ .04⅜

Ducks

Prices for hose and belting ducks again receded during the course of the fortnight, but the other grades remained steady. Demand for all grades continued to be light. Current price quotations follow:

Belting and Hose	lb.	.22½	@ .24
Enameling	lb.	.22	@ .22½
Single filling	lb.	.10	@ .10½
Double filling	lb.	.11	@ .11½

CHEMICALS

EXCEPT for a few minor changes, the price structure for rubber chemicals and compounding ingredients remained stable during the course of the past fortnight. Demand was noticeably better in March than in any month since last summer, and April orders show a tendency to pick up even further. Carbon black has been in much better demand from tire factories, and March shipments are estimated to have at least equalled production for the first time in many months.

ACCELERATORS

Organic			
A-1	lb.	.24 @	.27
A-5-10	lb.	.33 @	.36
A-7	lb.	.55 @	.59
A-11	lb.	.62 @	.66
A-16	lb.	.57 @	.61
A-19	lb.	.58 @	.62
A-20	lb.	.64 @	.68
A-32	lb.	.80 @	.95
Aldehyde ammonia, crystals	lb.	.65 @	.70
Aniline oil, drums, f.o.b. works	lb.	.14½@	.16
Captax	lb		
Crylene	lb.	.55 @	.65
paste	lb.	.45 @	.55
Di-Ortho-Tolyguanidine	lb.	.42 @	.44½
Diphenylguanidine	lb.	.30 @	.32½
Ethylidene aniline	lb.	.45 @	.47½
Formaldehyde aniline	lb.	.37½@	.40
Heptene	lb.	.40 @	—
Hexamethylene-tetramine	lb.	.58½@	.61
Lithex	lb.	.18 @	.20
Methylenedianiline	lb.	.37½@	.40
Monex	lb.	3.25 @	--
Oxynone	lb.	.68 @	.80
Phenex	lb.	.75 @	—
Pipeol	lb.	4.30 @	4.50
R & H 40	lb.	.40 @	.42½
R & H 50	lb.	.40 @	.42½
R & H 397	lb.	.75 @	.77½
R-2	lb.	1.95 @	2.15
Safex	lb.	1.20 @	1.25
SPDX	lb.	.75 @	—
Super-Sulphur No. 1	lb.		
No. 2	lb.		
Tensilac, No. 39	lb.	.40 @	.42½
Tensilac, No. 41	lb.	.50 @	.52½
Thermio F	lb.	.50 @	.55
Thiocarbanilid, drums	lb.	.21 @	.23
TMTT	lb.	3.00 @	3.25
Trimene	lb.	.75 @	—
base	lb.	1.20 @	—
Triphenylguanidine	lb.	.58 @	.60
Tuads	lb.		
Ureka	lb.	.75 @	1.00
Vulcanex	lb.		
Vulcone	lb.		
Vulcanol	lb.		
Z-88-P	lb.	.50 @	.60
Zimate	lb.		
Inorganic			
Lead, sublimed blue	lb.	.08¼@	—
Lead, white	lb.	.08½@	.08¾
Litharge, domestic	lb.	.07¾@	—
Magnesia, calcined, light	per 100 lb.	5.35 @	5.45
heavy	per 100 lb.	3.65 @	3.75

COLORS

Blacks (See Compounding Materials)			
Blues			
Prussian	lb.	.35 @	.36
Ultramarine	lb.	.06 @	.32
Browns			
Sienna, Italian	lb.	.05½@	.12½
Umber, Turkey	lb.	.04½@	.07
Greens			
Chrome, light	lb.	.30 @	.32
medium	lb.	.31 @	.33
dark	lb.	.34 @	.36
Chromium Oxide, bbl.	lb.	.34½@	.35½
Reds			
Antimony crimson, 15/17	lb.	.40 @	.44
sulfur, free	lb.	.56 @	.66
golden, 15/17 F.S.	lb.	.20 @	.25
Indian English	lb.	.08 @	.11
Domestic (Maroon)	lb.	.11 @	—
Oximony	lb.	.13¼@	—
Red oxide, pure	lb.	.10 @	.12
Smith's 444 Crimson f.o.b. Springfield	lb.	.08¾@	.10
Rub-Er-Red, f.o.b. Easton	lb.	.08¾@	—
Venetian red	lb.	.08 @	.06
Vermillion, quicksilver, English	lb.	1.75 @	1.80
Whites			
Lithopone, Akcolith	lb.	.05 3/5@	.06
Lithopone, Albalith	lb.	.05¼@	.05¾
Lithopone, Azolith	lb.	.05¼@	.05¾
Lithopone, Vanolith	lb.	.05¾@	—
Titanium oxide	lb.	.21 @	—
Titanox B, f.o.b. St. Louis,	lb.	.06½@	.07
Titanox C, f.o.b. St. Louis,	lb.	.07 @	.07½
Zinc Oxide—American Process			
American Azo:			
ZZZ (lead free)	lb.	.06½@	.07
ZZ (leaded)	lb.	.06⅝@	.06⅞
Horsehead Brand:			
Special	lb.	.07 @	.07½
XX Green	lb.	.07 @	.07½
XX Red, lead free	lb.	.06½@	.07
Kadox, black label	lb.	.10⅜@	.10⅞
blue label	lb.	.09⅜@	.09⅞
red label	lb.	.08 @	.08½
St. Joe, black label	lb.	.06½@	.07
red label	lb.	.06½@	.07
Zinc Oxide—French Process			
Anaconda, lead free	lb.	.06½@	.07
Anaconda, selected lead free	lb.	.07 @	.07½
White seal	lb.	.11⅛@	.11⅞
Green seal	lb.	.10⅜@	.10⅞
Red seal	lb.	.09⅝@	.09⅞
Yellows			
Chrome	lb.	.16½@	.17
Ocher, French medium	lb.	.02 @	.03
domestic	lb.	.01¾@	.02

COMPOUNDING MATERIALS

Aluminum Flake	ton	21.85 @	24.50
Ammonia carbonate, lump	lb.	.10½@	.12
Asbestine	ton	14.75 @	18.00
Barium carbonate	lb.	.03½@	.05
Barium Dust	lb.	.05 @	.06
Barytes southern off-color	ton	12.00 @	18.00
Western prime white	ton	23.00 @	—
imported	ton	27.00 @	36.00
Basofor	lb.	.04½@	—
Bentonite	lb.	.02 @	.03
Blacks			
Arrow "Aerofloted"	lb.	.03½@	.08½
Bone Black	lb.	.06 @	.12½
Carbon, compressed	lb.	.03 @	.07
Carbon, uncompressed	lb.	.03 @	.07
Disperso, f.o.b. Louisiana	lb.	.03½@	—
Disperso, f.o.b. Texas	lb.	.036 @	—
Drop Black	lb.	.06 @	.14
Fumonex	lb.	.03½@	.07½
Excello, compressed	lb.	.04 @	.08
Gastex, f.o.b. Texas	lb.	.03 @	.06
Lamp Black	lb.	.10 @	.40
Micronex	lb.	.03½@	.08½
Thermatomic-Thermax	lb.		
Flex	lb.		
P-33	lb.		
United carbon, fob Tex.	lb.	.03½@	.08½
Velvetex carbon	lb.	.03 @	.06
Blanc fixe dry f.o.b. works	ton	75.00 @	90.00
Carrara filler	lb.	.01¾@	.02
Catalpo (fact.)	lb.	.02 @	—
Clay, Kaolin, domestic	ton	8.00 @	9.00
Aerfloted, Suprex	ton	8.00 @	20.00
Colloidal	lb.	.05 @	.08
Congaree, c. l. f.o.b. mine	ton	9.00 @	—
Dark Blue Ridge	ton		
Dixie	ton		
Langford	ton		
Lexington	ton	10.00 @	22.00
Mineral Flour, c.l. f.o.b. mine	ton	20.00 @	23.00
Par	ton		
Tensulite		15.00 @	—
Glues, extra white	lb.	.25 @	.26
medium white	lb.	.22 @	.24
Magnesia, carbonate	lb.	.08¾@	.11
Mica, white water grnd.	lb.	.06 @	.08
Off color (biotite)	lb.	.05 @	.07
Rotten Stone (powdered)	lb.	.02 @	.05
Soapstone, powdered	ton	15.00 @	22.00
Starch, powdered	cwt.	— @	2.92
Talc, domestic	ton	12.00 @	15.00
Pyrax A	ton		
Whiting, commercial	cwt.	— @	1.00
English cliffstone	cwt.	1.75 @	2.00
Quaker	ton		
Superfine	ton	10.00 @	12.00
Sussex	ton		
Witco	ton	20.00 @	—
Zinc Carbonate	lb.	.09½@	.10½
Zinc Stearate	lb.	.19 @	.22

MINERAL RUBBER

Genasco (factory)	ton	50.00 @	52.00
Granulated M. R.	ton		
Hard Hydrocarbon	ton		
Paradura	ton	62.50 @	65.00
Parmr, solid	ton	28.00 @	48.00
Pioneer, MR, solid	ton	40.00 @	42.00
Pioneer-granulated	ton	50.00 @	52.00
R & H Hydro-Carbon	ton	27.05 @	29.00
Robertson, MR, solid	ton	34.00 @	80.00
M.R. (gran)	ton	38.00 @	80.00

SOFTENERS

Acids			
Nitric, 36 degrees	cwt.	5.00 @	5.25
Sulfuric, 66 degrees	cwt.	1.60 @	1.95
Tartaric, crystals	lb.	— @	.31½
Acids, Fatty			
Laurex	lb.	.15 @	.16
Stearex	lb.	.13 @	.17
Stearic, double pressed	lb.	.17 @	.22
Alkalies			
Caustic soda, 76%	cwt.	2.90 @	—
Soda ash, 58% C.L.	cwt.	1.17½@	—
Oils			
Corn, refined, bbls.	lb.	.08¾@	.10½
Cottonseed, crude		.06⅞@	.07
Cycline	gal.	.27 @	.34
Degras (c.l. 100 bbls.)	lb.	.03¾@	—
Less c.l. (10-25 bbls.)	lb.	.04 @	—
Lots less than 10 bbls.	lb.	.04¼@	.04½
Fluxrite	lb.	.05½@	.06½
Palm Lagos	lb.	.05 @	.06
Niger	lb.	.04½@	.05¼
Para-Flux	gal.	.17 @	—
Petrolatum, white	lb.	.08 @	.08½
Pigmentaroil	gal.	.18 @	.23
Pine, steam distilled	gal.	.65 @	.70
destructively distilled	gal.	.54 @	.55
Witco Palm Oil	lb.	.11 @	—
Witco Softener (f.o.b. wks.)	lb.	.02 @	—
Resins and Pitches			
Pitch, Burgundy	lb.	.06½@	.07½
coal tar	gal.	.05½@	.06
pine, 200 lb. gr. wt.	bbl.	7.00 @	—
Rosin, grade K, 280 lb.	bbl.	— @	6.35
Pigmentar	gal.	.18 @	.23
Tar Retort, 50 gal.	bbl.	13.50 @	15.00
Solvents			
Acetone, pure	lb.	.10 @	.10½
Alcohol, denatured, No. 1 bbls.	gal.	.27 @	.29
Benzol, 90%	gal.	.20 @	.21
Carbon, bisulphide	lb.	.05½@	.06¼
Carbon, tetrachloride	lb.	.06¼@	.07
Dryolene (f.o.b. Okla.)	gal.	.10 @	.10½
Gasoline, steel bbls.	gal.	.16 @	—
Naphtha, solvent	gal.	.30 @	.38
Rub-Sol (f.o.b. Okla.)	gal.	.09 @	—
Turpentine, spirits	gal.	.54 @	.56
wood	gal.	.51 @	.61
destructively distilled	gal.	.35 @	—
Waxes			
Beeswax, white	lb.	.34 @	.36
Carnauba	lb.	.26 @	.28
Ceresin, white	lb.	.10 @	.11
Montan, crude	lb.	.06½@	.07
Ozokerite, black	lb.	.24 @	.25
green	lb.	.26 @	.30
Paraffin (c.l.—f.o.b. N. Y.)			
Yellow crude scale	lb.	.02½@	—
White crude scale 124/126	lb.	.02½@	—
Refined, 125/127	lb.	.03¾@	—
Refined, 128/130	lb.	.03¾@	—
Refined, 135/137	lb.	.05¼@	—
Refined, 138/140	lb.	.07¼@	—

ANTI-OXIDANTS

Agerite, Resin	lb.		
Powder	lb.		
White	lb.		
Albasan	lb.	.70 @	.75
Antox	lb.		
B-L-E	lb.	.57 @	.60
Neozone	lb.		
Oxynone	lb.	.68 @	.80
Resistox	lb.	.54 @	.57
Stabilite	lb.	.57 @	.62
Stabilite Alba	lb.	.70 @	.75
VGB	lb.	.55 @	.66

SPECIALTIES

Sunproof	lb.	.35 @	.37½
Sponge Paste	lb.	— @	.30
Tonox	lb.	.56 @	.60

SUBSTITUTES

Black	lb.	.08 @	.14
White	lb.	.10 @	.16
Brown	lb.	.08 @	.15

VULCANIZING INGREDIENTS

Sulfur Chloride (drums)	lb.	.03½@	.04½
Sulfur flour,			
Ref'n'd, 100% pure (bags)	cwt.	2.40 @	2.75
Commercial (bags	cwt.	1.75 @	2.10
Vandex	lb.		